Beeville Water Supply Study

Alternative Water Supply Feasibility Report

PREPARED FOR

City of Beeville

June 2025

Beeville Water Supply Study

Alternative Water Supply Feasibility Report

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June 2025

Garver Project No. W09-2500203

Engineer's Certification

I hereby certify that this Alternative Water Supply Feasibility Report for the Beeville Water Supply Study was prepared by Garver under my direct supervision for the City of Beeville.

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Table of Contents

List of Figures

List of Tables

List of Acronyms

Acronym	Definition
ADD	average day demand
AIS	American Iron and Steel
BABA	Build America, Buy America
BOR	Bureau of Reclamation
City	City of Beeville
CFR	Code of Federal Regulations
COA	Certificate of Approval
DBE	Disadvantaged Business Enterprise
DCP	drought contingency plan
DFund	Texas Development Fund
DPR	direct potable reuse
DWSRF	Drinking Water State Revolving Fund
EFR	engineering feasibility report
EPA	Environmental Protection Agency
FY	Fiscal Year
GCD	Groundwater Conservation District
gpcd	gallons per capita per day
HUB	Historically Underutilized Buisness
IPR	indirect potable reuse
IPP	initially prepared plan
IUP	Intended Use Plan
LOI	Letter of Intent
MBE/WBE	Minority Business Enterprise/Women Business Enterprise
MDD	maximum day demand
MGD	million gallons per day
MWD	municipal water district
NEPA	National Environmental Policy Act
NOFA	Notice of Funding Announcement
NRSRO	Nationally Recognized Statistical Rating Organization
OPCC	opinion of probable construction cost
OMB	Office of Management and Budget
PIF	Project Information Form
PPL	Project Priority List
PS	pump station
QBS	qualifications-based selection
RFP	request for proposals
RFQ	request for qualifications
RO	reverse osmosis
SDWA	Safe Drinking Water Act
SFY	State Fiscal Year

Acronym	Definition
STWA	South Texas Water Authority
SWIFT	State Water Implementation Fund for Texas
SWMOR	surface water monthly operating reports
TAC	Texas Administrative Code
TCEQ	Texas Commission on Environmental Quality
TDS	total dissolved solids
TWDB	Texas Water Development Board
UVAOP	ultraviolet advanced oxidation process
WEEG	Water and Energy Efficiency Grant
WIFIA	Water Infrastructure Finance and Innovation Act
WMSP	water management strategy project
WTP	water treatment plant
WWTP	wastewater treatment plant

Executive Summary

The City of Beeville (City) provides retail water service to approximately 13,211 residents through over 4,730 active connections in Bee County, Texas. The City's primary water source is surface water from Lake Corpus Christi, treated at the George P. Morrill Water Treatment Plant (WTP) and conveyed approximately 18 miles via the Clareville Pump Station. Groundwater from four wells at Chase Field supplements the supply, serving areas outside the city limits, while in-town wells were decommissioned due to rising salinity. In response to declining lake levels and persistent drought conditions, the City launched efforts to evaluate alternative water sources. To support long-term supply resilience, the City contracted Garver to conduct a feasibility study assessing the projected water supply gap, regional trends, infrastructure needs, implementation timelines, and potential alternative supply strategies.

Water Demand and Supply Gap Analysis

As part of the Alternative Water Supply Feasibility Study, a water demand and supply gap analysis was conducted to evaluate current and projected water demand relative to available supply capacity over a 10-year planning horizon with the goal of identifying potential supply shortfalls and inform infrastructure and planning decisions. Over the past three years, average monthly billed consumption was 2.63 million gallons per day (MGD), with usage ranging from 1.88 to 3.36 MGD and a slight upward trend observed during this period. In 2024, industrial users outside the city limits accounted for 57% of total billed consumption. Residential customers made up 19%, while apartment and commercial users (each) contributed 6 to 7%. All other customer categories individually represented less than 5% of total system demand. A system-wide water loss rate of 20% was applied as a conservative planning assumption, reflecting historical trends, data variability, and available data limitations. Daily production data from the George P. Morrill WTP from 2022 to 2024 was used to determine a maximum month to MDD escalation factor. A factor of 1.10 was applied. Estimated average daily demand (ADD) and maximum daily demand (MDD) over the 2022–2024 period were 3.2 MGD and 4.2 MGD, incorporating a 20% water loss and a 1.1 max month-to-day escalation factor. Per capita water use was calculated using population and demand data, and planning values of 230 gallons per capita per day (gpcd) for ADD and 302 gpcd for MDD were applied to future projections based on three growth scenarios: 0.5%, 1.0%, and 2.0% annually. Baseline demand projections were scaled using monthly demand multipliers derived from historical billing data to reflect seasonal peaks and lows consistent with observed usage trends in the demand projections. Under the most conservative assumption (2%), ADD is projected to reach 5 MGD and MDD to 6.7 MGD by 2036.

Daily production data from the WTP over the past 10 years shows a general decline in surface water use since 2021. This trend reflects the integration of the Chase Field Wells into the City's supply portfolio, which reduced reliance on surface water by an average of 29% from 3 MGD to approximately 2.0 MGD. Chase Field Wells currently serve the prison and Chase Field complex, with reported operation up to 1.5 MGD. It is anticipated that future industrial and commercial growth at Chase Field could consume the entire Chase Well Field capacity, leaving no groundwater available to supplement the City's supply. In a critical planning scenario assuming continued reservoir decline and full allocation of Chase Field groundwater to Chase Field non-residential developments, an immediate supply shortfall of 3 MGD is projected, increasing to 6.7 MGD over the next 10 years based on water demand projections. This study evaluates the feasibility of alternative water supply options to address these projected shortfalls.

Alternative Supply Feasibility Assessment

Based on the Demand and Supply Gap Analysis, the City must develop at least 3.0 MGD of short-term water supply and plan for 6.7 MGD of new water supplies to address long-term drought periods. In the short term, the George P. Morrill WTP, with a capacity of 7 MGD, requires rehabilitation to ensure its reliability. Additionally, six inactive groundwater wells, with a combined capacity of 6.9 MGD, require evaluation and potential rehabilitation. Two wells specifically, Wells 6 and 7, were identified by third party inspection as the most suitable for rapid redeployment. These wells should be equipped with well-head RO treatment systems to address salinity in the wells.

For long-term solutions, the City should consider establishing a centralized brackish groundwater reverse osmosis (RO) system to enhance efficiency and reduce maintenance costs. Developing new groundwater wells, while adhering to constraints from local Groundwater Conservation Districts, is also essential. Potable reuse at the Moore Street Wastewater Treatment Plant (WWTP) could recover approximately 2.5 MGD of water. Furthermore, the City has options for purchased water agreements, including seawater desalination and partnerships with Seven Seas Water Group and Nueces River Authority.

These measures are crucial to ensuring a reliable water supply for the City during both drought conditions and in the long term.

Operational Considerations

Because the City relies on contract operations at the surface water plant, providing operators for a City owned and run facility is a critical consideration that could affect feasibility of the brackish RO and potable reuse water supply alternatives. For the initial project phases, up to 6 operations staff are needed. Additionally, TCEQ and Texas Administrative Code require that these operators have completed an approved 8-hour RO training program and that the responsible operator may need Class B or Class C certification.

Infrastructure, Treatment and Cost Comparison

A cost comparison was performed that evaluated capital costs, operating costs and water rights or water purchase costs. This evaluation included the development of Class 5 OPCCs for each alternative and the development of estimated operating costs. Net Present Value costs are summarized in Table ES-1. Levelized water rates are presented in Table ES-2. Based on life cycle cost estimates, and levelized water rates, the cost of the well head and centralized brackish water RO projects are the lowest overall cost alternatives. The development of the Welder R J Ranch LTD water supply project is the next lowest cost option, followed by direct potable reuse and then the purchased water options. It is assumed that the Seven Seas Water Group’s project will not be undertaken if the City elects to undertake the brackish water RO projects and the Nueces River Authority is assumed to be cost prohibitive.

Table ES-1: Water Purchase Options – Net Present Value Summary

Project Phase	Water Rights Purchase	CAPEX	Initial Annual OPEX	Levelized Annual OPEX	30-Year NPV	Book Value of City Assets	Time to Implement (Months)
Well Head RO Treatment (3 MGD)		$26.8M	$2.1M	$6.3M	$122.0M	$26.8M	6-12
Centralized Brackish RO (6 MGD)		$77.4M	$3.4M	$13.9M	$272.4M	$77.4M	24-36
Direct Potable Reuse (3 MGD)		$64.8M	$3.2M	$12.2M	$238.4M	$64.8M	36-60
Welder J R Ranch LTD	$50M[3]	$94.5M	$4.0M	$22.4M	$439.6M	$94.5M	24-48
Nueces River Authority (6 MGD)1		$0	$26.3M	$40.3M	$788.4M	$0	60+
Seven Seas Water Group (6 MGD)		$0	$12.0M	$18.5M	$361.4M	$0	12-24

Table Notes:

1. Nueces River Authority option will see purchase water price escalation. Initial annual O&M costs of roughly $26M increases to $64M over the 30-year planning window.
2. Seven Seas option will see purchase water price escalation. Initial annual O&M of roughly $12M increases to $28.4M over the 30-year planning window.
3. The water rights purchase price is assumed based on other water rights costs reported regionally.

Table ES-2: Water Purchase Options – Levelized Water Rate

Project Phase	Initial Water Rate	Levelized Water Rate ($/Kgal)
Well Head RO Treatment (3 MGD)	$3.42	$5.69
Centralized Brackish RO (6 MGD)	$3.72	$6.35
Direct Potable Reuse (3 MGD)	$6.54	$11.10
Welder Ranch	$5.90	$10.40
Nueces River Authority (6 MGD)1	$12.00	$18.37
Seven Seas Water Group (6 MGD)	$5.50	$8.42

Project Funding

An adaptive and dynamic funding strategy is essential for the City to effectively diversify its water supply. Beeville is considered a small and disadvantaged community by many of the funding agencies' standards. Subsequently, the City is well-positioned to access potential principal forgiveness and grant-based funding through various state and federal programs. The Texas Water Development Board (TWDB) offers several options that include, but are not limited to, the Drinking Water State Revolving Fund (DWSRF), State Water Implementation Fund for Texas (SWIFT), and Texas Development Fund (DFund) Programs. Federally, the EPA's Water Infrastructure Finance and Innovation Act (WIFIA) Program and the Bureau of Reclamation's WaterSMART Program provide complementary opportunities.

These programs offer significant financial incentives but can come with stringent compliance requirements, such as adherence Code of Federal Regulations (CFR) 2 CFR Part 200 throughout advertising and procurement, Davis-Bacon Act, American Iron and Steel (AIS) or Build America, Buy America (BABA), National Environmental Policy Act (NEPA), and Disadvantaged Business Enterprise (DBE) mandates, among others. By aligning project timing, eligibility, and compliance capabilities with the appropriate combination of federal and state programs, Beeville can maximize access to low-cost financing and grants. Implementing a phased strategy that targets programs with the quickest funding turnaround will provide the City with the flexibility and financial efficiency needed to deliver critical water infrastructure and resiliency improvements.

Water Supply Strategy Development

Based on the findings of this evaluation and potential funding options, a three-phase work plan is recommended. The recommended work plan is summarized in Table ES-3.

Table ES-3: Recommended Work Plan

Phase of Work	Completion Date	Anticipated Construction Cost[1]	New Water Treatment Capacity	Description
Phase 1	12 Months	$32M	3 MGD	Rehab groundwater wells, implement well head RO. Implement surface brine disposal. Complete master planning for City water system.
Phase 2	36 Months	$47M	3 MGD	Implement centralized RO. Design and Permit brine disposal wells.
Phase 3	60 Months	$65M	3 MGD	Implement secondary water supply and brine disposal wells.

Table Notes:
1. Anticipated Construction costs do not include engineering, permitting or bidding service costs.

Conclusions and Recommendations

The City's primary water supply from Lake Corpus Christi faces significant drought-related risks. To ensure water availability during ongoing droughts and improve future drought resiliency, alternative water supply options were evaluated. The demand analysis indicates that up to 7 MGD of alternative water supply is needed over the next ten years.

For immediate needs, well head reverse osmosis (RO) is recommended for emergency implementation due to its rapid deployment and ease of future redeployment. Initially, surface water brine discharge will be used, as it can be quickly implemented compared to brine disposal wells. Following this, centralizing RO treatment is advised to optimize operations and provide a long-term solution, with brine disposal wells designed and permitted during this phase.

Once the brackish groundwater treatment system is completed, developing a secondary water supply and constructing brine disposal wells is recommended. Given the potential risks associated with new groundwater wells outside the City, potable reuse is suggested. A conceptual cost evaluation supports budget planning, and further master planning is recommended to refine project assumptions and projected water demand.

1.0 Introduction

The City of Beeville (City) provides retail water service to approximately 13,200 residents through more than 4,730 active connections in Bee County, Texas. Located in the Coastal Bend region, the City is situated between Corpus Christi and San Antonio, approximately 60 miles northwest of Corpus Christi.

The City's water system is primarily supplied by surface water from Lake Corpus Christi, which is treated at George P. Morrill WTP and conveyed approximately 18 miles via the Clareville Pump Station (PS) to the City's distribution system. Surface water supply is supplemented by four groundwater wells located at Chase Field, which serve the Chase Field Industrial and Airport Complex area and the Texas State Prison-McConnell Unit. Historically, the City also operated additional groundwater wells within the city limits; however, due to increasing salinity levels, these wells were gradually decommissioned, with the last groundwater well used for potable supply taken out of service in 2016.

In response to declining lake levels and persistent drought conditions, the City has implemented a Water Conservation and Drought Contingency Plan (DCP). This Plan establishes phased strategies to manage limited water supplies during drought periods and other emergency scenarios. Concurrently, the City has initiated efforts to identify and evaluate alternative water supply sources to address growing concerns over drought severity, reduced surface water reliability, and long-term water supply resilience. To support this initiative, the City contracted Garver to perform a feasibility evaluation of potential alternative water supply options. This evaluation includes a comprehensive water supply gap analysis, an assessment of regional trends, development of a water supply strategy, infrastructure requirements, capital and operational costs, funding availability and implementation timelines.

The following items were completed as part of this project and are documented in this report:

- **Water Demand and Supply Gap Analysis**: Includes historical water demand analysis, population and growth projections, development of unit demand factors for future planning, evaluation of existing water supply sources, and assessment of overall supply reliability.
- **Alternative Supply Feasibility Assessment:** Includes descriptions of alternative water supply projects evaluated during this assessment.
- **Operational Considerations:** includes a preliminary estimate of plant staffing needs for water treatment and specialized requirements for reverse osmosis system operators.
- **Infrastructure, Treatment and Cost Comparison:** includes OPCC and life cycle cost summaries for the treatment options considered in this evaluation.
- **Project Funding:** summarizes potential funding options that can be used for alternative water source development projects.
- **Water Supply Strategy Development:** includes an implementation plan for feasible water supply alternatives.

Figure 1-1 illustrates the location of the WTP, Corpus Christi Lake supply intake and City of Beeville's water supply system. Figure 1-2 illustrates the existing water system facilities.

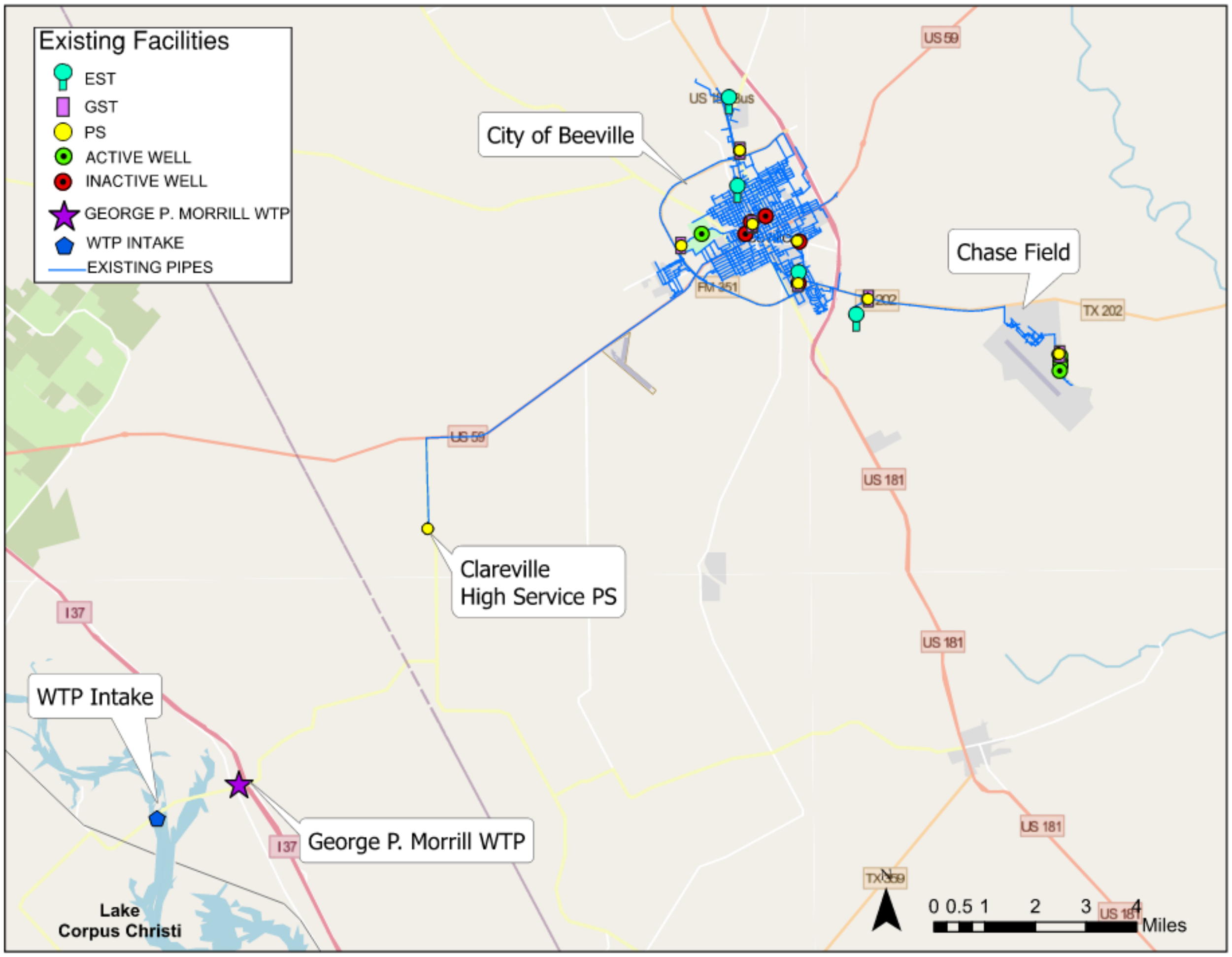

Figure 1-1: System Overview Map

Figure 1-2: Existing System Facilities

2.0 Water Demand and Supply Gap Analysis

This section evaluates the City's long-term water needs in relation to its current supply capacity. The analysis includes a review of historical demand patterns, population and demand growth projections, and existing water supply sources. It also examines supply reliability and regional drought trends. Together, these components provide the basis for identifying potential supply shortfalls and informing future water supply planning and infrastructure investment.

2.1 Water Demand Assessment

2.1.1 Data Sources

The following data sources were used to support the water demand and supply gap analysis:

- Monthly water utility customer billing data from 2022 through 2024; including account number and total monthly usage
- Account master sheet, including account number, customer class, service address, status, and service dates
- Monthly customer connections from 2014 to 2024
- Surface Water Monthly Operating Reports (SWMORs) for Morrill WTP from 2014 to 2024
- Beeville 2040 Comprehensive Plan as adopted in June 2022
- Future Development information (e.g. approximate location, type of development, and estimated number of connections and/or area) compiled from meeting with City of Beeville, held on March 24th, 2025
- GIS data including customer meters, facilities and water pipelines
- City of Beeville 2017 Water Master Plan
- Capital Project Financing Plan dated March 10, 2025

2.1.2 Historical Water Demand Analysis

Monthly customer billing data from 2022 to 2024, along with connection counts, were used to estimate system-wide water consumption and assess customer growth. To account for non-revenue water, a system-wide water loss of 20% was applied to the billed consumption. This estimate was based on available audit records, as discussed in more detail below.

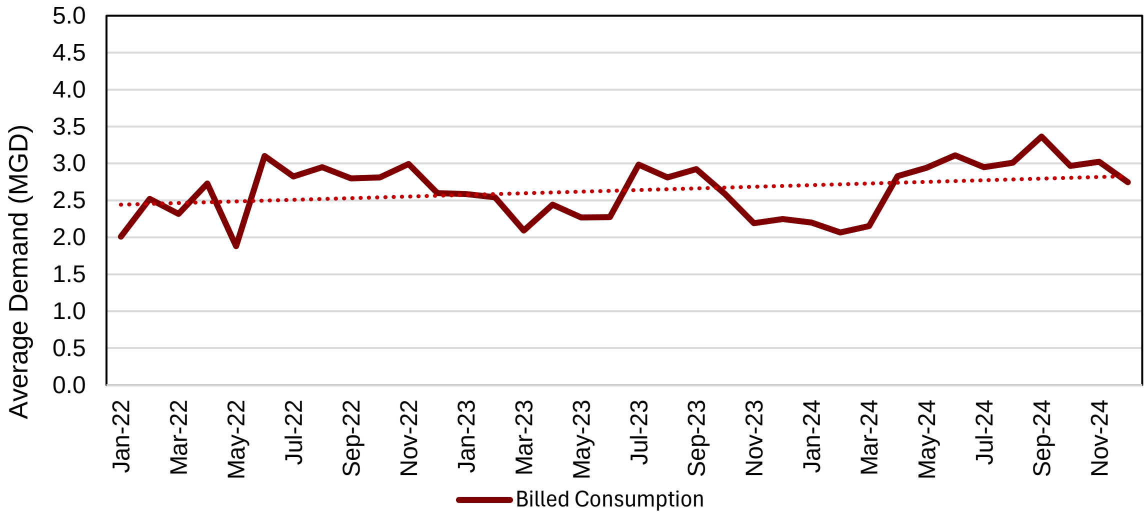

Figure 2-1 illustrates the total monthly billed consumption during this period, which averaged 2.63 MGD and ranged from 1.88 to 3.36 MGD. A slight upward trend was noted across the three years.

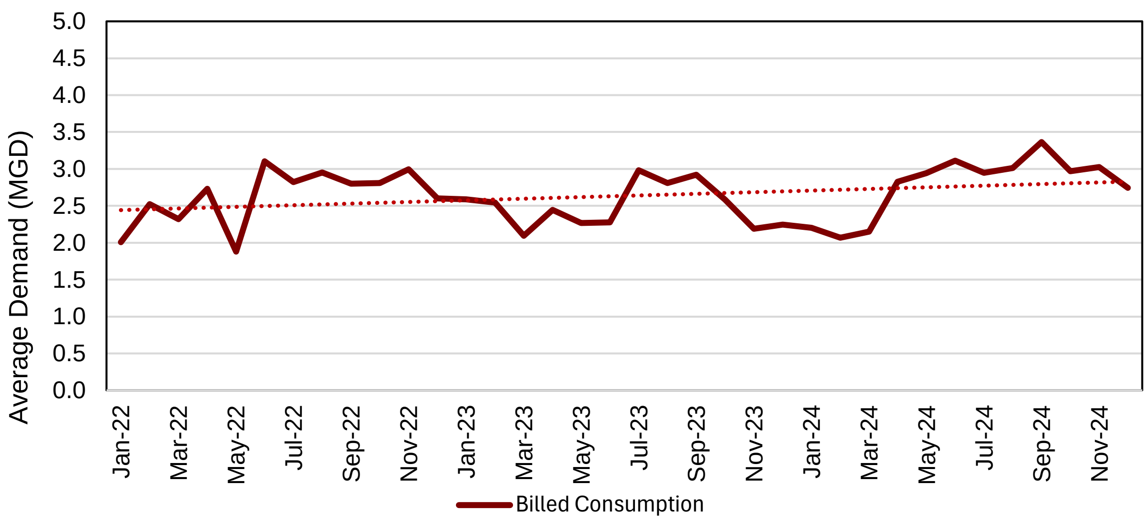

Figure 2-1: Monthly Demand from 2022 to 2024

In 2024, approximately 41% of total billed consumption was attributed to customers located within the city limits, while the remaining 59% corresponded to customers outside the city. Among all customer categories, industrial users represented the largest share at 57% of total system demand. Residential users contributed about 19%, while apartment and commercial customers each accounted for between

6% to 7%. All other customer categories individually represented less than 5% of overall demand (Figure 2-2).

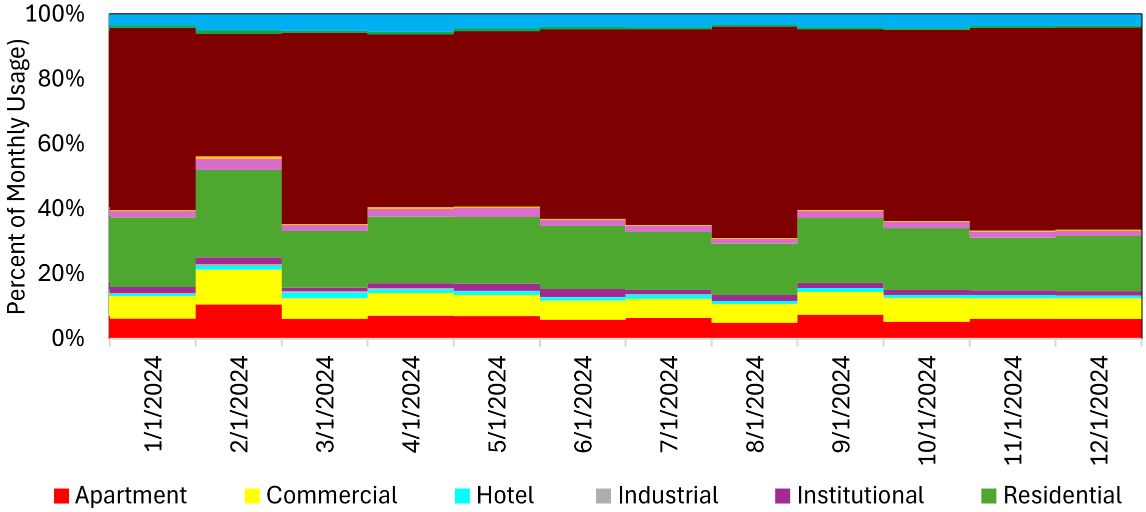

Figure 2-2: 2024 Percent of Total Monthly Usage by Customer Type

To estimate water loss, water balance data for the City of Beeville was obtained from the Texas Water Development Board (TWDB) Water Loss Audit Summaries for all available reporting years. Data was unavailable for the period from 2016 to 2022; therefore, the analysis was limited to years with complete records. Due to these data gaps, the results offer only a partial representation of system performance and may not fully reflect annual variability.

Revenue and non-revenue water volumes for all years with available data is summarized in Table 2-1 and illustrated in Figure 2-3. The highest recorded system-wide water loss occurred in 2015 at 25.2%, followed closely by 2023 at 24.9%. Earlier audits reported lower water loss levels, ranging from approximately 7% to 15%. According to the Environmental Protection Agency (EPA) publication Water Audits and Water Loss Control for Public Water Systems, the national average water loss for public systems is approximately 16%. Given the limitations of the available data and variability in historical losses, a 20% annual water loss rate was assumed and added to the billed consumption and projected system demand. This represents a conservative planning assumption, consistent with both the City's historical audit trends and national benchmarks.

Table 2-1: Water Balance Summary

Year	Total System Input (MG/yr)	Billed Consumption (MG/yr)	Unbilled Consumption (MG/yr)	Apparent Loss (MG/yr)	Real Loss (MG/yr)
2012	1,135	957	20	13	146
2013	964	845	14	11	94
2014	866	805	11	10	40
2015	963	720	55	35	153
2023	1228	922	2	53	250

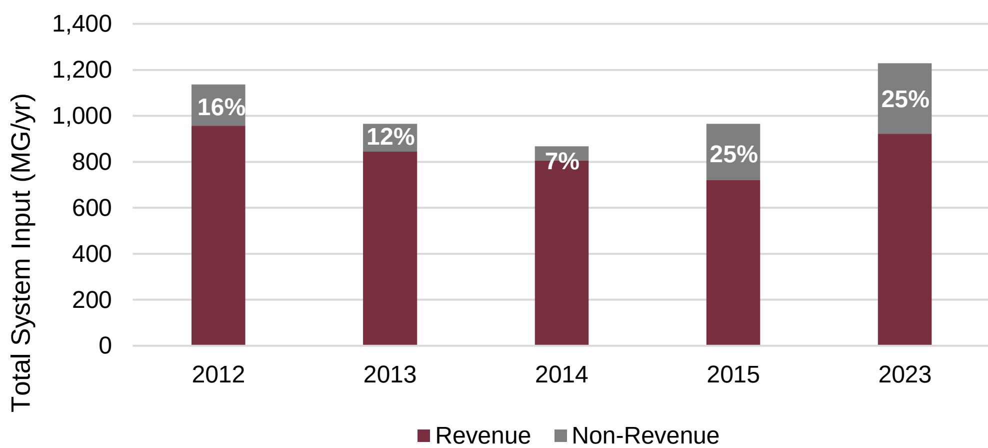

Figure 2-3: Revenue and Non-Revenue Water Comparison

Daily production data for Morrill WTP from 2014 to 2024 was used to determine a maximum month to maximum day escalation factor. Surface Water Monthly Operating Reports (SWMOR) records were either unavailable or incomplete for several months, including January–December 2015; March 2016; January, August, and November 2020; January 2021; June and October 2022; July 2023; and June 2024. The production data provided represents only treated surface water flows from the WTP and does not include contributions from the Chase Field wells. No flow records or operational data for the Chase Field Wells was available during the preparation of this analysis.

WTP production trends have shown a general decline since 2020, reflecting the integration of the Chase Field Wells into the City’s supply portfolio, which reduced the City’s reliance on surface water by an average of 29%. From 2014 to 2020, the WTP’s average daily production was approximately 3 MGD. In the years following 2020, average production declined to approximately 2 MGD (Figure 2-4).

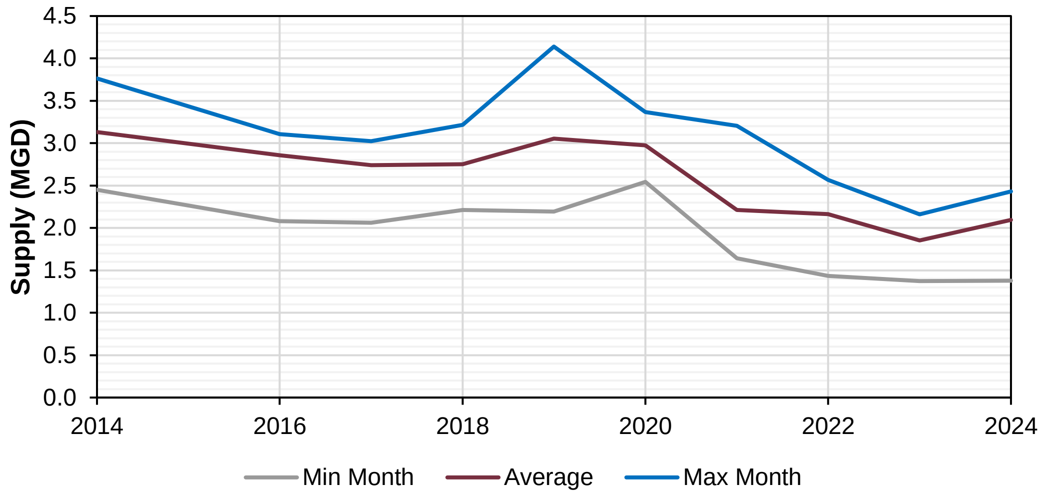

Figure 2-4: Historical Minimum Month, Average and Max Month Production from Morrill WTP

Production data corresponding to the billing period (2022–2024) is summarized in Table 2-2. Based on this three-year dataset, the Maximum Day Demand (MDD) was approximately 1.24 times the Average Day Demand (ADD) and 1.06 times the Maximum Month Demand. For planning purposes, a Max Month to MDD escalation factor of 1.10 was applied.

Table 2-2: 2022-2024 WTP Water Production

Year	Min Month (MGD)	Average (MGD)	Max Month (MGD)	Max Day (MGD)	Max Month to Max Day
2022	1.43	2.16	2.57	2.58	1.01
2023	1.37	1.85	2.16	2.38	1.10
2024	1.38	2.10	2.43	2.62	1.08
Avg	**1.40**	**2.04**	**2.39**	**2.53**	**1.06**

Figure 2-5 illustrates the estimated ADD and MDD for the period 2022–2024, incorporating a 20% water loss adjustment and a max month to max day escalation factor of 1.1. During this three-year period, the estimated ADD was approximately 3.2 MGD, while the MDD was approximately 4.2 MGD. These demand conditions, along with the City's population data for each year, were used to calculate per capita water use. The resulting per capita demands served as the basis for developing future demand projections. Based on this analysis, it is recommended that planning values of 230 gallons per capita per day (gpcd) for ADD and 302 gpcd for MDD be used in future water demand forecasting (Figure 2-6).

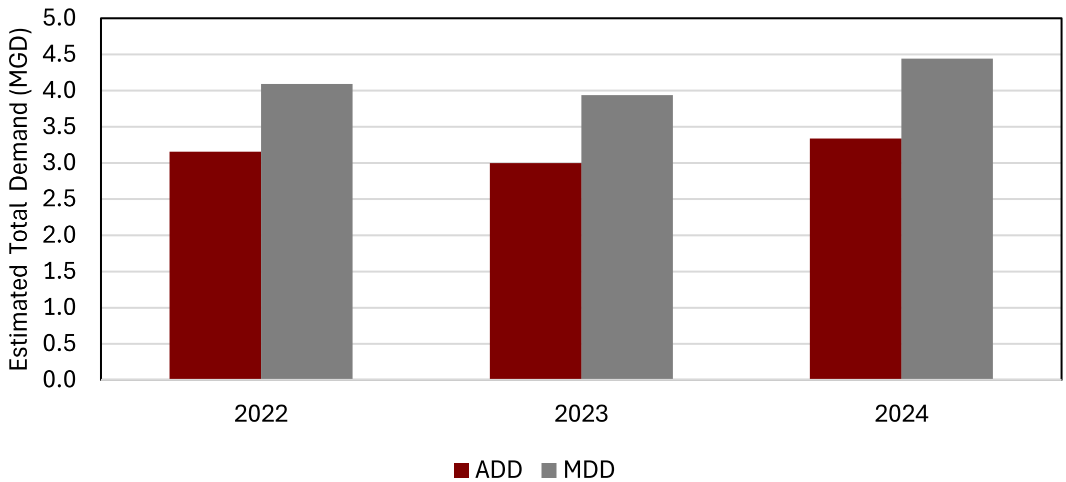

Figure 2-5: Historical Average and Max Day Demand from 2022 to 2024

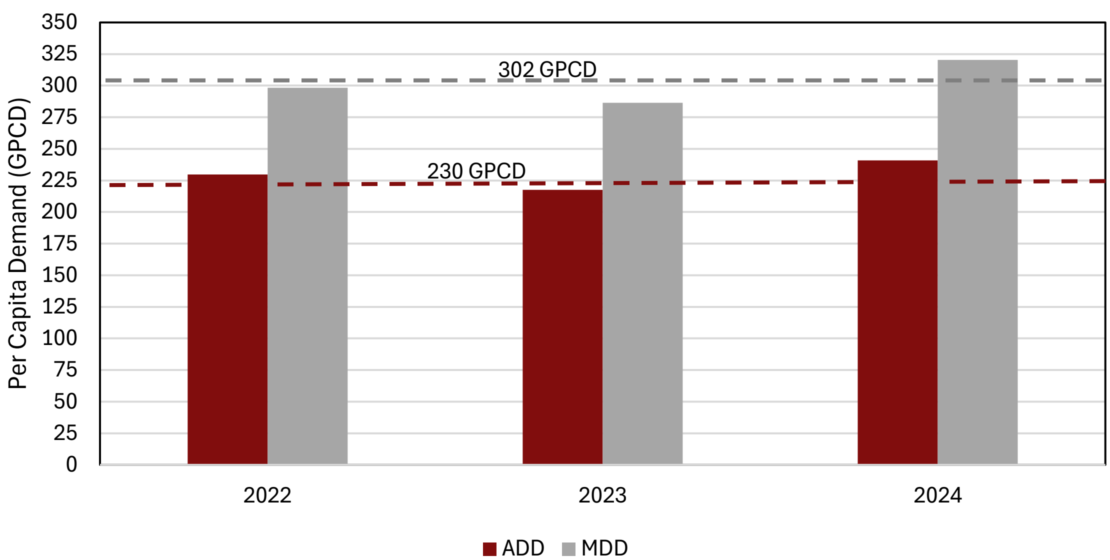

Figure 2-6: Historical Average and Max Day Per Capita Demand from 2022 to 2024

The historical connection data was used to assess the overall growth in the customer base and is displayed in Figure 2-7. The number of active water connections has remained relatively stable over the past decade, averaging approximately 4,730 connections per month. The maximum number of recorded connections was 4,863 in May 2014, while the minimum was 4,622 in July 2016. This relatively narrow range indicates limited growth in the number of service connections over the analysis period.

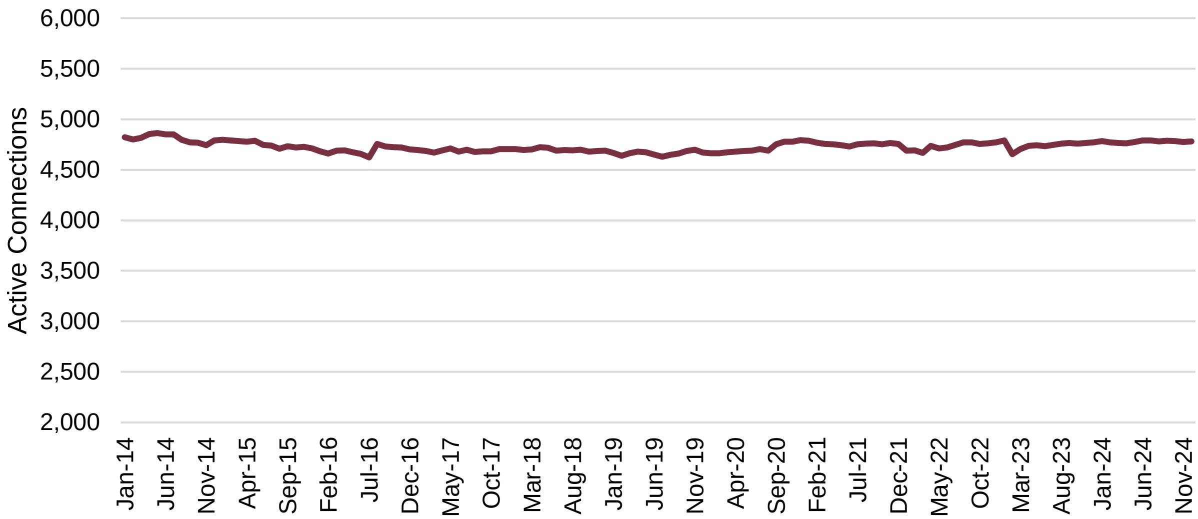

Figure 2-7: Total Monthly Active Connections from 2014 to 2024

2.1.3 Population and Demand Growth Projections

Historical population data for 2010 and 2020 was obtained from the U.S. Census Bureau. Population estimates for the years in between were derived using the number of active service connections provided by the City and an average household size of 2.9 persons per connection, based on known historical data. The City's population has experienced minimal year-to-year fluctuation (with exception of 2014 and 2015) but has shown a steady overall increase over time (Figure 2-8).

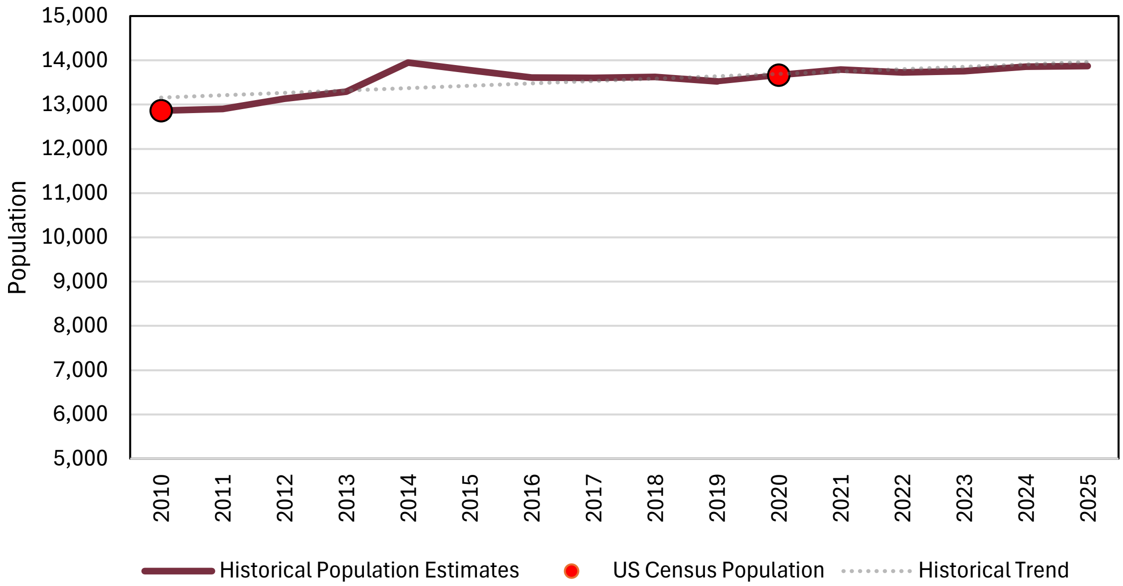

Figure 2-8: Historical Population

Three constant annual growth rates were assumed for future population projections, based on historical population trends, the 2017 Water Master Plan, and the 2022 City of Beeville Comprehensive Plan. It is assumed that future population growth will fall within a range of 0.5% to 2% over the 10-year planning horizon. This includes low (0.5%), medium (1.0%), and high (2.0%) growth scenarios. All three projections are summarized in Table 2-3 and compared to historical population trends in Figure 2-9.

Table 2-3: Projected Population

Year	0.5% Growth Rate	1% Growth Rate	2% Growth Rate
2026	13,868	13,868	13,868
2027	13,938	14,007	14,146
2028	14,008	14,148	14,429
2029	14,079	14,290	14,718
2030	14,150	14,433	15,013
2031	14,221	14,578	15,314
2032	14,293	14,724	15,621
2033	14,365	14,872	15,934
2034	14,437	15,021	16,253
2035	14,510	15,172	16,579
2036	14,583	15,324	16,911

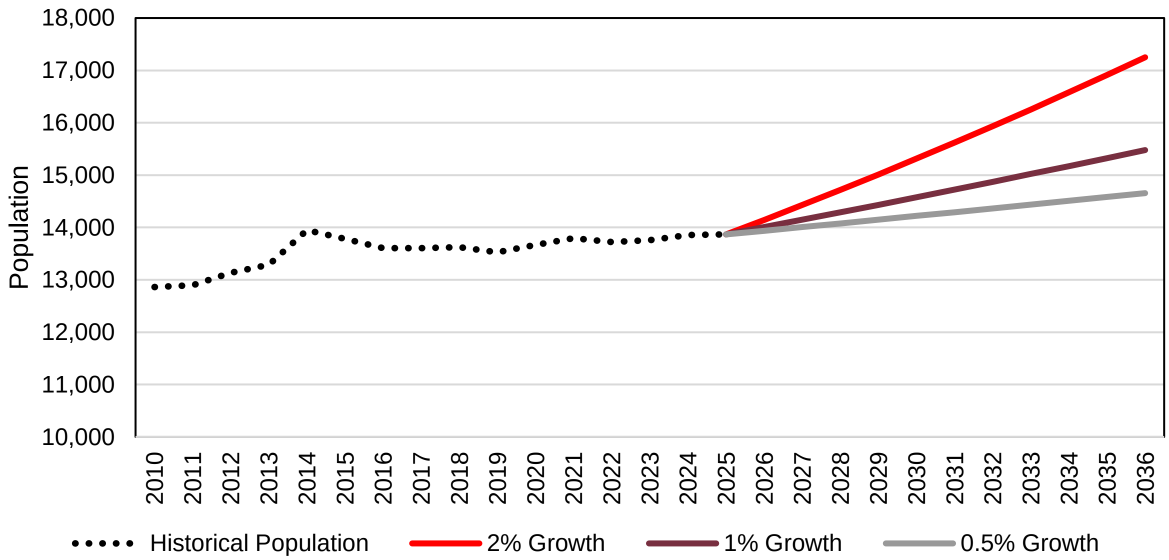

Figure 2-9: Historical and Projected City of Beeville Population

Projected ADD and MDD values for low (0.5%), medium (1.0%), and high (2.0%) annual growth scenarios are summarized in Table 2-4, based on per capita ADD and MDD values of 230 gpcd and 302 gpcd, respectively.

Table 2-4: Baseline Projected Demand

Year	ADD (MGD) 0.5% Growth	MDD (MGD) 0.5% Growth	ADD (MGD) 1% Growth	MDD (MGD) 1% Growth	ADD (MGD) 2% Growth	MDD (MGD) 2% Growth
2026	3.21	4.21	3.22	4.23	3.25	4.27
2027	3.22	4.23	3.25	4.27	3.32	4.36
2028	3.24	4.25	3.29	4.32	3.39	4.44
2029	3.25	4.27	3.32	4.36	3.45	4.53
2030	3.27	4.29	3.35	4.40	3.52	4.62
2031	3.29	4.32	3.39	4.45	3.59	4.72
2032	3.30	4.34	3.42	4.49	3.66	4.81
2033	3.32	4.36	3.45	4.54	3.74	4.91
2034	3.34	4.38	3.49	4.58	3.81	5.01
2035	3.35	4.40	3.52	4.63	3.89	5.11
2036	3.37	4.43	3.56	4.67	3.97	5.21

Seasonal demand patterns observed in the past three years were assumed to continue over the planning period. To account for this variability, baseline demand projections were scaled using monthly demand multipliers derived from historical billing data, allowing the projections to reflect seasonal peaks and lows consistent with observed usage trends (Figure 2-10). Under the most conservative growth scenario of 2% annually, Average Day Demand is projected to reach up to 5.0 MGD, and Maximum Day Demand up to 6.7 MGD by 2036.

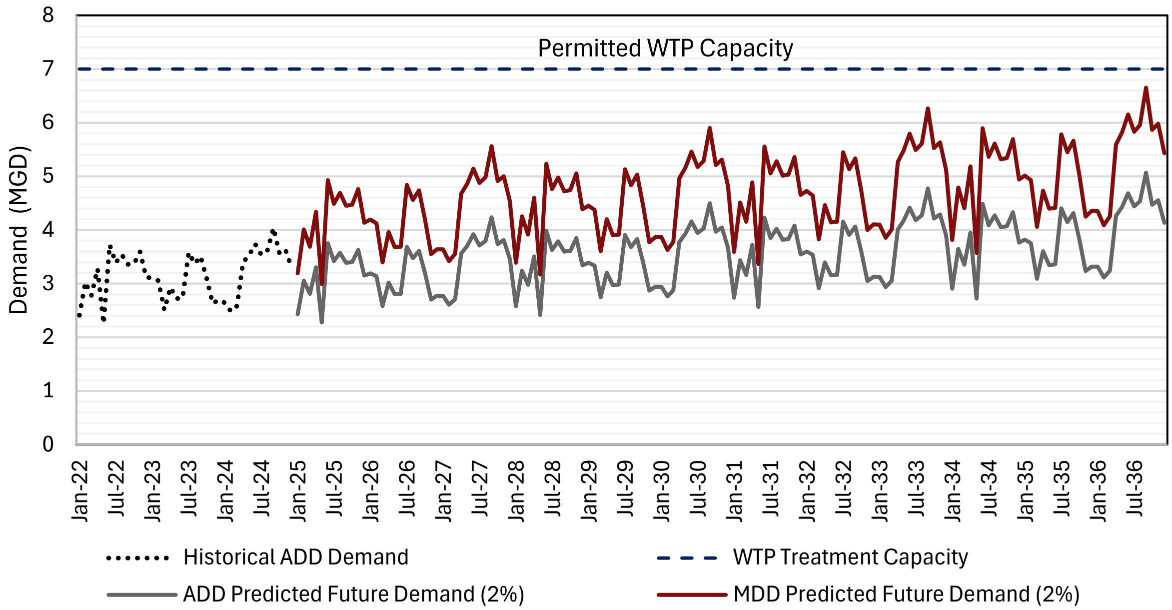

Figure 2-10: Projected Maximum Day Demand

2.2 Water Supply Capacity Assessment

The City of Beeville's potable water supply has primarily been sourced from Lake Corpus Christi and treated at the George Morrill WTP. To supplement this source and enhance overall system reliability, the City also operates four groundwater wells located at Chase Field. These wells serve non-residential areas outside city limits, including the Chase Field Industrial and Airport Complex and the Texas Department of Criminal Justice's McConnell Unit. Historically, Beeville relied more extensively on groundwater, with several wells (designated Wells 3 through 9) located within city limits. However, over time, rising salinity levels in the local aquifers rendered these sources unsuitable for potable use. As a result, the City gradually phased out its in-town groundwater wells, with the last potable well taken offline in 2016.

2.2.1 Groundwater

The City currently has four active potable water wells (Chase Field Wells), six inactive groundwater wells and one additional well for non-potable water purposes. The active wells withdraw water from layers within the Gulf Coast Aquifer, including the Goliad Sand, Lagarto Clay, Oakville Sandstone, Jasper Aquifer, and Oakville Sandstone. Table 2-5 provides details on the active wells, including their rated pumping capacities.

Table 2-5: Chase Field Groundwater Wells

Well	Status	Well Depth	Rated Capacity	Tested Capacity
Chase Field 1	Active	621 ft	320 gpm	359 GPM
Chase Field 2	Active	620 ft	312 gpm	373 gpm
Chase Field 3	Active	631 ft	312 gpm	377 gpm
Chase Field 4	Active	616 ft	312 gpm	368 gpm
		Total Well Capacity	1,256 gpm	1,477 gpm
			1.8 mgd	**2.13 mgd**

The City of Beeville reported that the Chase Field Wells typically operate at up to 1.5 MGD, with approximately 0.5 MGD available for domestic use within the City and the remaining 1.0 MGD allocated to meet existing demands in the Chase Field area; however, anticipated industrial and commercial growth at Chase Field area could significantly increase local water demand, potentially consuming the entire Chase Field well capacity. In a critical planning scenario, future projections should assume that 100% of the Chase Field well capacity may be allocated to Chase Field developments, leaving no groundwater available to supplement the City's supply. A detailed evaluation of potential growth in the area should be included as part of the City's next comprehensive water master plan.

Table 2-6 summarizes the City's currently inactive wells. These sites offer documented production capacity, utilize existing infrastructure on City-owned land, are exempt from local groundwater conservation district (GCD) regulations, and can produce water of a quality that may be treatable for beneficial use. The feasibility of rehabilitation based on the condition of each well is further discussed in Section 3.0 of this report.

Table 2-6: Groundwater Wells within City Limits

Well	Status	Well Depth	Rated Capacity
City of Beeville Well #3	Inactive	1,539	570 gpm
City of Beeville Well #4	Inactive	622	800 gpm
City of Beeville Well #5	Inactive	1,526	573 gpm
City of Beeville Well #6	Inactive	1,600	1,000 gpm
City of Beeville Well #7	Inactive	1,554	825 gpm
City of Beeville Well #8	Inactive	1,581	1,018 gpm
City of Beeville Well #9	Active*	560	300 gpm
		Total Well Capacity	5,086 gpm
			7.32 mgd
*City of Beeville Well #9 is currently active but is not used for potable water consumption due to high salinity levels.			

2.2.2 Surface Water

Surface water from Lake Corpus Christi, located approximately 50 miles from the City provides potable water supply for Beeville. Lake Corpus Christi is a reservoir formed by the Wesley E. Seale Dam on the Nueces River and is owned by the City of Corpus Christi. According to a 2016 volumetric survey by the Texas Water Development Board (TWDB), the lake has a total storage capacity of 256,339 acre-feet. At a conservation pool elevation of 94 feet, the lake spans approximately 19,748 acres and is primarily sustained by rainfall and runoff from the Nueces and Frio River basins. As the holder of the water rights, the City of Corpus Christi is the primary supplier of water from Lake Corpus Christi. In addition, two wholesale water providers, San Patricio Municipal Water District (MWD) and South Texas Water Authority (STWA) also deliver water from the reservoir to nearby entities (Table 2-7).

Table 2-7: Corpus Christi Lake Wholesale Providers

City of Corpus Christi	San Patricio Municipal Water District	South Texas Water Authority
San Patricio MWD	City of Aransas Pass	City of Bishop
South Texas Water Authority	City of Greory	City of Driscoll
City of Alice	City of Ingleside	City of Agua Dulce
City of Beeville	City of Odem	Nueces County WCID #5
Corpus Christi Naval Air Station	City of Portland	Nueces WSC
City of Mathis	City of Rockport	City of Kingsville
City of Three Rivers	City of Taft	Ricardo WSC
Nueces County WCID 4	Rincon WSC	
Violet WSC	Nueces WCID 4 (Port Aransas)	
	Seaboard WSC	
	Ingleside on the Bay	

Lake Corpus Christi is primarily fed by rainfall and runoff, making its storage volume highly dependent on regional weather conditions. Figure 2-11 illustrates drought conditions in the County from 2000 to the present, highlighting multiple periods of exceptional drought within the area. For planning purposes, the designated drought of record for the Coastal Bend region spans from 2007 to 2013. Following the drought of record, high rainfall events in 2013 and 2015 temporarily replenished storage volumes. However, the combined Lake Corpus Christi and Choke Canyon Reservoir system has not been classified as full since September 2007. As of February 2020, system storage remained at approximately 52% of capacity.

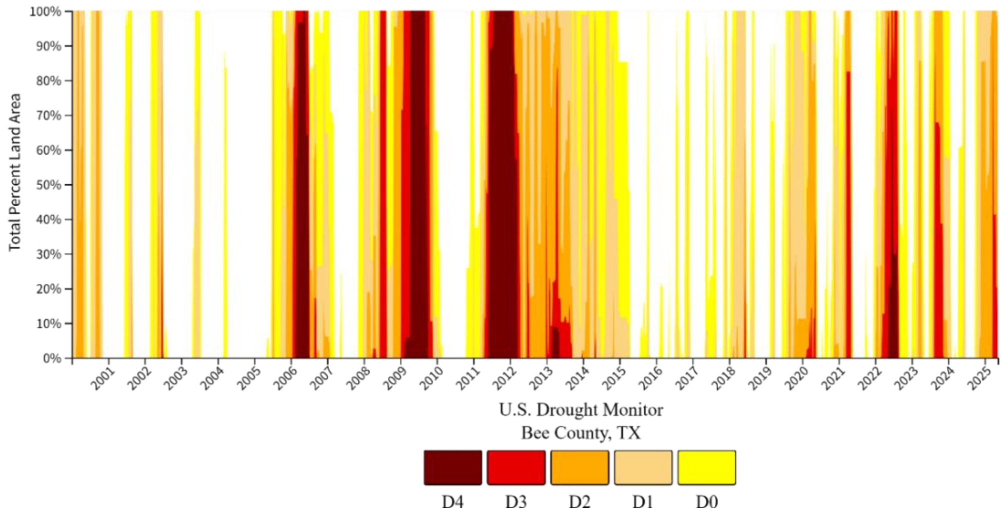

Figure 2-11: Bee County Historical Drought Conditions

Over the past two decades, reservoir levels have exhibited substantial year-to-year variability, reflecting the increasing frequency and severity of drought conditions. The 2025 Region N Initially Prepared Plan (IPP) identifies water supplies in this region as highly vulnerable to drought, with annual inflows to Lake Corpus Christi declining following each major drought event. Figure 2-12 shows that 2024 marks a new historic low, surpassing the previous low recorded during the 2012–2013 drought of record, approximately 12 years earlier.

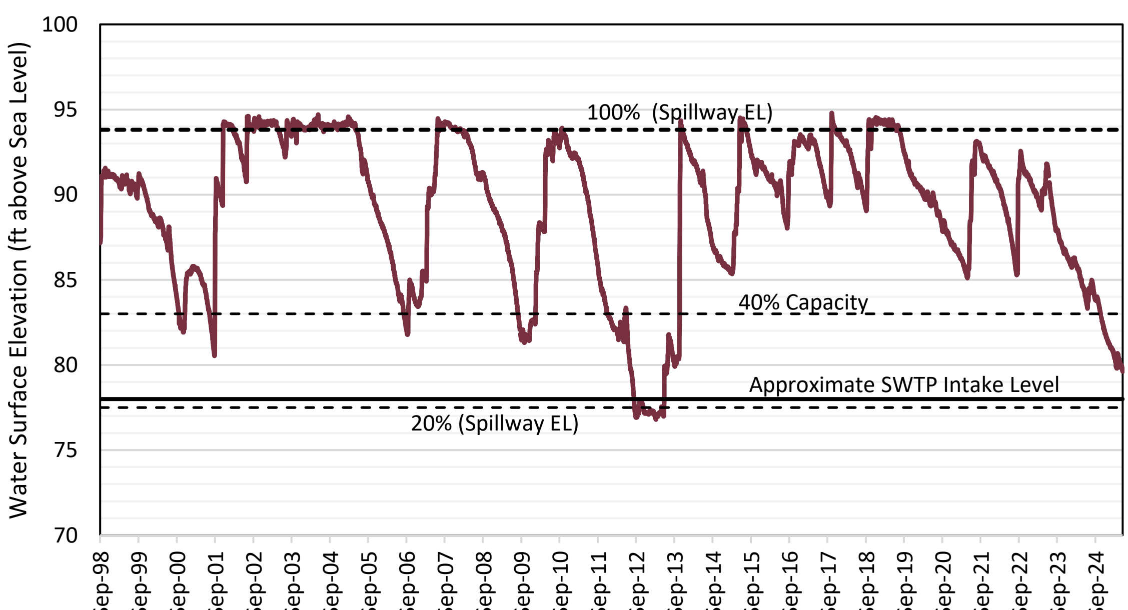

Figure 2-12: Corpus Christi Lake Historical Level Surface Elevations (Source: TWDB)

Although the WTP intake is located in one of the deepest sections of the river channel, where water depth is approximately 10 feet, declining lake levels pose an increasing risk to intake operability. Lake Corpus Christi levels also serve as triggers for staged water emergency responses. Current projections by the City of Corpus Christi indicate a Level 1 Water Emergency may be reached by late 2026, corresponding to approximately 180 days of remaining surface water supply from the Western System (Lake Corpus Christi and Choke Canyon Reservoir).

Several factors influence the projected water level of Lake Corpus Christi, including evaporation, inflows, precipitation, and water releases by regional providers. A reservoir system model for the Nueces River Basin is currently being developed by others for the City of Corpus Christi. For the purposes of this study, a critical-case planning scenario is assumed, in which lake levels continue to decline at the same linear rate observed over the past two years. Under this scenario, surface water is assumed to become completely unavailable in the present year, representing a critical condition for evaluating when projected demands will exceed available supply (Figure 2-13).

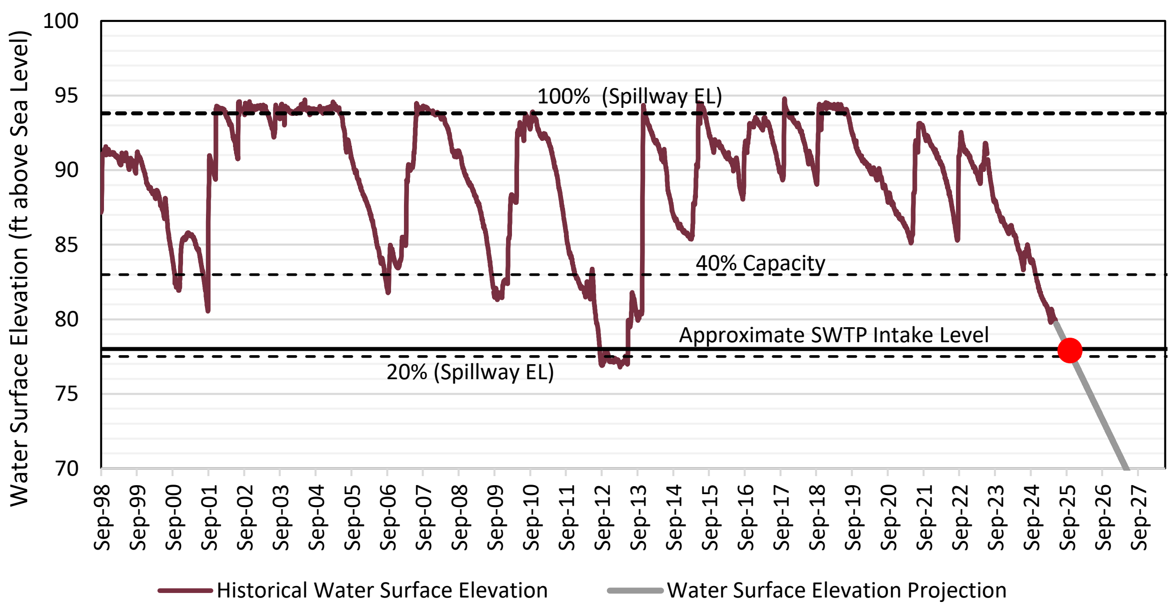

Figure 2-13: Corpus Christi Lake Water Surface Elevation Linear Decline Rate

2.3 Water Demand and Supply Gap

Historical water demand, population trends, projections, and known available supply were used to estimate the City of Beeville's immediate and long-term water supply gap over a 10-year planning horizon. The analysis is based on a critical planning scenario in which surface water becomes unavailable in the near term, to help identify both immediate and long-term supply shortfalls. The supply gap estimates presented below are based on the following assumptions:

- Population Growth
  - The City of Beeville's population is projected to grow at 2% annually, representing the most conservative (i.e., highest) growth rate considered within the 0.5% to 2% range.
- Per Capita Water Use
  - Future demand projections use a planning value of 230 GPCD for ADD and 302 GPCD for MDD, based on historical consumption and system-wide water loss adjustments. These estimates reflect a critical planning scenario and assume no operational changes, or conservation measures are implemented over the planning horizon.
- Seasonal Demand Variability
  - Seasonal demand patterns observed in the past three years were assumed to continue over the planning period. To account for this variability, baseline demand projections were scaled using monthly demand multipliers derived from historical billing data, allowing the projections to reflect seasonal peaks and lows consistent with observed usage trends.
- Surface Water Availability
  - Lake Corpus Christi is assumed to continue declining at the linear rate observed over the past two years. Under this critical-case scenario, surface water is assumed to become entirely unavailable for the City of Beeville in the near term, resulting in an immediate supply shortfall.
- Chase Field Wells
  - Chase Field wells have a tested capacity of up to 2.13 MGD, however, a typical operating production of approximately 1.5 MGD is reported.
- Chase Field Demand Allocation

It is assumed that enough industrial and commercial growth at Chase Field will occur within the next three years, fully consuming the existing Chase Field well capacity. Under this scenario, 100% of the Chase Field groundwater supply is allocated to Chase Field, leaving no groundwater available to support in-city demands.

The projected demand and supply gap over the 10-year planning horizon accounting for monthly usage patterns under ADD and MDD conditions is illustrated in Figure 2-14. Table 2-8 summarizes the projected annual supply shortfall by year and demand condition. The annual demand estimates correspond to the maximum monthly demand for each year. Based on the assumptions outlined in this study, an immediate supply shortfall of approximately 3.0 MGD is projected under MDD conditions. This deficit is expected to increase to 6.7 MGD by the end of the 10-year period. These estimates reflect a critical planning scenario and assume no operational changes, infrastructure upgrades, or emergency conservation measures are implemented over the planning horizon.

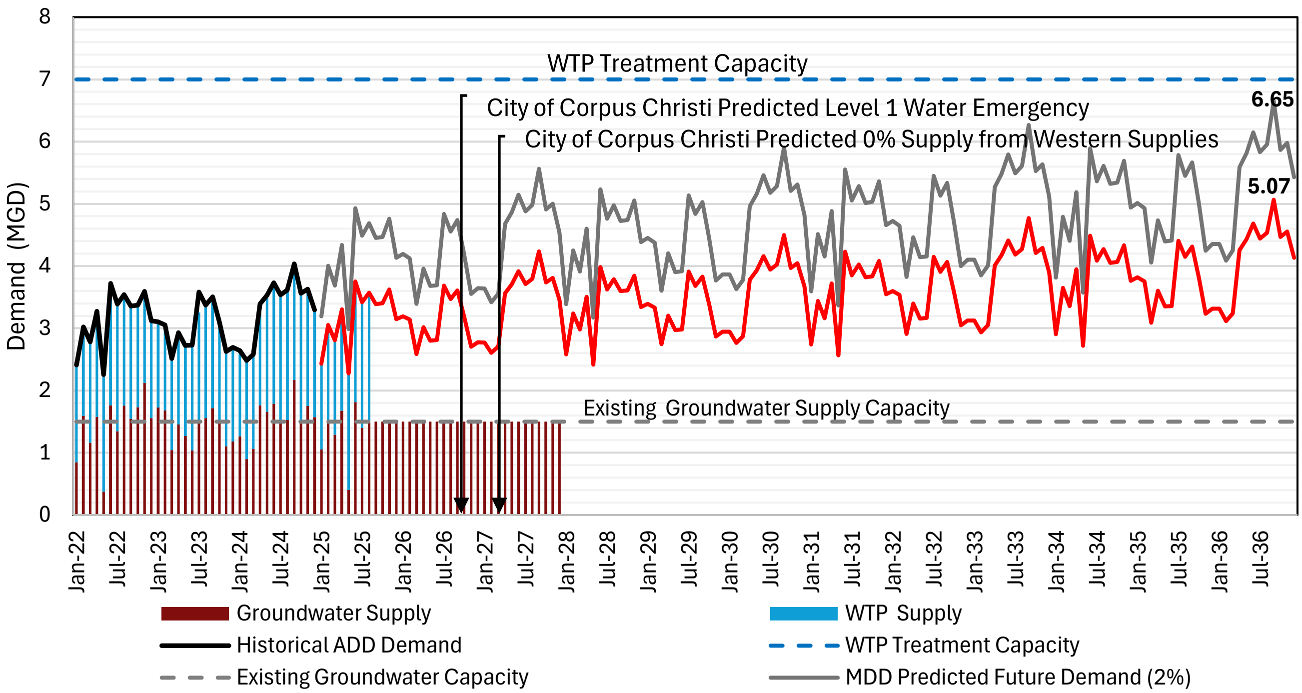

Figure 2-14: Existing Supply and Projected Demand

Table 2-8: Projected Water Demand and Supply Gap

Timeframe	Available Groundwater Supply (MGD)	Available Surface Water Supply	Projected ADD (MGD)	Estimated ADD Supply Gap (MGD)	Projected MDD (MGD)	Estimated MDD Supply Gap (MGD)
2025	1.5	0	3.39	**1.26**	4.45	**2.32**
2026	1.5	0	3.68	**1.55**	4.84	**2.71**
2027	1.5	0	4.24	**2.11**	5.56	**3.43**
2028	0	0	3.98	**3.98**	5.23	**5.23**
2029	0	0	3.91	**3.91**	5.13	**5.13**
2030	0	0	4.50	**4.50**	5.91	**5.91**
2031	0	0	4.23	**4.23**	5.55	**5.55**
2032	0	0	4.15	**4.15**	5.45	**5.45**
2033	0	0	4.77	**4.77**	6.27	**6.27**
2034	0	0	4.49	**4.49**	5.89	**5.89**
2035	0	0	4.41	**4.41**	5.78	**5.78**
2036	0	0	5.07	**5.07**	6.65	**6.65**

2.4 Summary

An analysis of historical water demand was conducted using monthly utility billing data from 2022 to 2024 and available daily production data from the George Morrill WTP. Over this three-year period, average monthly billed consumption was approximately 2.63 MGD, with values ranging from 1.88 to 3.36 MGD and a slight upward trend in demand. In 2024, industrial users located outside the city limits accounted for 57% of total system demand. Residential customers represented 19%, while apartment and commercial users each contributed between 6% and 7%. All remaining customer classes individually accounted for less than 5% of total demand.

Ten years of daily WTP production data were reviewed as part of this assessment. Between 2014 and 2020, average daily surface water production was approximately 3.0 MGD. Following the integration of groundwater from the Chase Field wells in 2020-2021, average surface water production decreased to approximately 2.0 MGD, representing a 29% reduction in reliance on surface water. Active water connections have remained relatively stable over the past decade, averaging approximately 4,730 per month. Production data from the Chase Field wells was not available for this analysis. As a result, total water demand was estimated using billed consumption, a maximum month to Max Day demand escalation factor and an assumed system-wide water loss rate. Water loss audits were available for only select years, limiting the analysis to those with complete records. Consequently, the findings represent a partial snapshot of system performance and may not fully reflect annual variability. The highest recorded system-wide water losses occurred in 2015 (25.2%) and 2023 (24.9%), while earlier audits reported lower losses ranging from approximately 7% to 15%. Given these data limitations and variability, a conservative water loss rate of 20% was applied for planning purposes.

Historical population data for 2010 and 2020 was obtained from the U.S. Census Bureau. Population estimates for the intervening years were derived using the number of active service connections provided by the City and an assumed average household size of 2.9 persons per connection, based on historical data. The City's population has shown a minimal, but steady overall increase. For planning purposes, three constant annual growth rates of 0.5%, 1.0%, and 2.0% were applied to future projections, informed by historical trends, the 2017 Water Master Plan, and the 2022 City of Beeville Comprehensive Plan. Per capita water use was calculated using historical population and estimated system demand. Recommended planning values for future projections are 230 gallons per capita per day (gpcd) for Average Day Demand (ADD) and 302 gpcd for Maximum Day Demand (MDD). Seasonal demand patterns observed in the past three years were assumed to continue over the planning period. Baseline demand projections were scaled using monthly demand multipliers derived from historical billing data, to reflect seasonal peaks and lows in the 10-year projection. Under the high-growth scenario (2% annual growth), ADD is projected to reach approximately 3.6 MGD and MDD approximately 6.7 MGD by 2036.

Beeville's potable water supply is primarily sourced from Lake Corpus Christi and treated at the George P. Morrill WTP. Surface water supply is supplemented by four groundwater wells at Chase Field, which primarily serve areas outside the city limits, including the Chase Field Complex and McConnell Unit. The city also operated groundwater wells located within the city; however, they were gradually decommissioned due to rising salinity levels, leaving in-city water demand fully reliant on surface water.

The active groundwater wells (Chase Field) have a rated capacity of 1.8 MGD, however the City reported that the Chase Field Wells typically operate at up to 1.5 MGD. It is anticipated that industrial and commercial growth at Chase Field area could significantly increase local water demand, potentially consuming the entire Chase Field well capacity. Future projections assume that 100% of the Chase Field well capacity will be allocated to Chase Field developments, leaving no groundwater available to supplement the City's supply within the next three-year period. Lake Corpus Christi has experienced substantial storage declines due to recurring droughts, with reservoir levels reaching a new historic low in 2024. Current projections suggest that water levels could drop below the WTP intake elevation in the present year. In a critical planning scenario assuming continued reservoir decline and full allocation of Chase Field groundwater to Chase Field non-residential developments, an immediate supply shortfall of 3 MGD is projected, increasing to 6.7 MGD over the next 10 years based on water demand projections.

Given the increasing uncertainty in the reliability of surface water from Lake Corpus Christi, driven by declining reservoir levels, limited rainfall, and rising regional demands, the City must consider additional sources to ensure immediate and long-term water supply security. As part of this effort, an evaluation was conducted to assess the feasibility of implementing alternative water supply strategies capable of addressing both short-term and long-term supply gaps. The following section presents the findings of this evaluation.

3.0 Alternative Supply Feasibility Assessment

Based on findings from the Water Supply Gap Analysis, the City needs to develop at least 3.0 MGD of short-term water supply and it is recommended that long term planning should provide 6.6 MGD on new water supplies to offset future long term drought periods.

3.1 Rehab of the Existing Water Treatment Plant

The City currently owns the George P. Morrill WTP. The plant utilizes a conventional treatment process with chlorine dioxide, clarification and dual media filtration and chloramine disinfection. The plant has a permitted treatment capacity of 7 MGD. Treated water from the plant is conveyed approximately 18 miles to the City by pipeline. A picture of the WTP is presented in Figure 3-1. Surface water is assumed to be the lowest cost water for the City to produce and from this perspective, the surface water plant should be rehabilitated and maintained in good condition. The City currently relies on contract operators, and the facility is geographically located outside of the City and far away from the Chase Well Field.

Figure 3-1: George P. Morrill WTP

The plant relies on a surface water intake located on the Nueces River upstream of Lake Corpus Christi. The intake was placed in a relatively deep spot in the river, but there are concerns about water availability at the intake during extended droughts. The City is currently investigating intake relocation into deeper locations in the reservoir.

The existing WTP is also aging, and repairs are needed to ensure that the treatment system is available. Treatment needs are currently being evaluated in a separate study that includes:

- Media Filter Rehab: Including replacement of filter media and rehab of underdrains plus minor control improvements to the piping and backwash system.
- Clarifier Rehab: Including replacement of sludge rake mechanisms on each of the existing clarifiers.
- Chemical Feed Optimization: Relocation of chlorine dioxide dosing location and evaluation of chemical dosing.

3.2 Short-Term Solutions

Short term solutions are needed to ensure availability for the City during the current drought. The primary short-term solution is to develop the existing groundwater wells within the City.

3.2.1 Rehab of Existing Groundwater Wells

The City currently has 6 inactive groundwater wells, with a total installed capacity of around 6.9 MGD. The groundwater wells lie within the city limits and are not part of a groundwater conservation district. The wells have been out of service for over 10 years, and the condition of the wells is currently unknown and under evaluation. It is recommended that the City considers bringing the wells online based on their existing condition and water quality.

The wells have been systematically taken out of service with minimal protection and initial assessment of the wells indicates that some of the wells require significant rehab work to return to service. Additionally, the groundwater quality has deteriorated over the life of the well field and the water is currently brackish. Desalination is needed to help control chlorides, sulfate and total dissolved solids. In the short term, Reverse osmosis can be deployed at each of the well sites. An example of a temporary well-head treatment system is presented in Figure 3-2.

Figure 3-2: Well Head RO System with Equipment Under Canopy (Goodyear, AZ)

It is recommended that the temporary RO trains be designed for relocation to a centralized facility with a planning window of 3 years for equipment relocation to the centralized facility. For this purpose, the RO trains should be skidded and modular in size to simplify plant operations in the ultimate centralized location. The overall treatment plant footprint requirement is approximately 40 by 20 feet. Instead of constructing a permanent treatment building, a pre-engineered metal building that can be repurposed or shade canopy should be provided for equipment protection.

Based on preliminary evaluation of the existing wells by a third party, two of the existing wells were found suitable for rehab. The suitable wells are Well 7 (1st Street Site) and Well 6 (Cook Site). The two wells previously had a combined capacity of 1,800 gpm (2.6 MGD). Based on anticipated water recovery and RO system performance, they can produce approximately 1 to 1.5 MGD of potable water. An additional well is recommended to provide up to 1.5 MGD of new groundwater. The anticipated brine disposal volume is 0.4 MGD.

3.3 Long-Term Solutions

Multiple long-term solutions were identified for the City including a centralized brackish groundwater reverse osmosis system fed by rehabbed existing groundwater wells, construction of new groundwater wells, wastewater reuse and purchased water agreements.

3.3.1 Centralization of Brackish Groundwater Reverse Osmosis

From an operational perspective, it is much more efficient to have one centralized RO treatment facility. Key benefits include reduction in required manpower, reduction in number of chemical deliveries, and significant maintenance savings due to reduced number of support systems. The conceptual treatment process is illustrated in Figure 3-3 and a similar RO treatment building is illustrated in Figure 3-4.

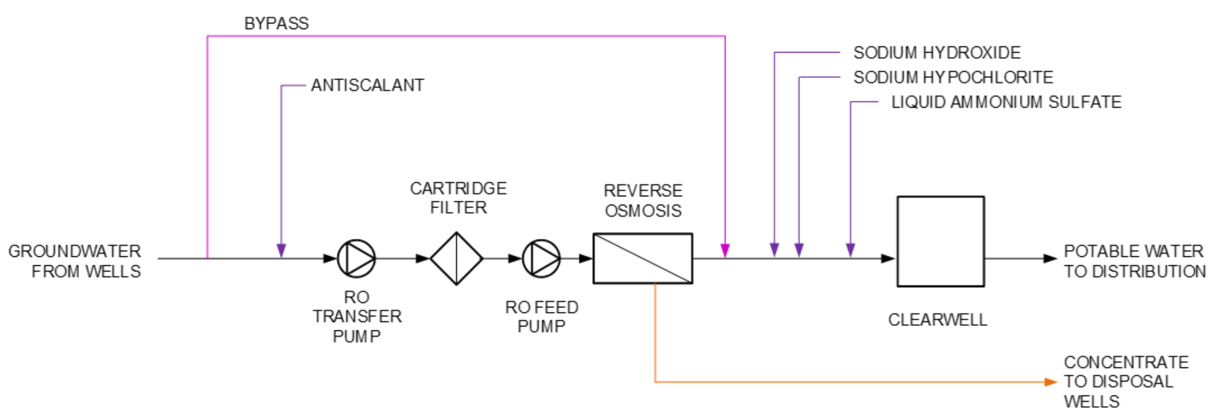

Figure 3-3: Conceptual RO Treatment Process Flow Schematic

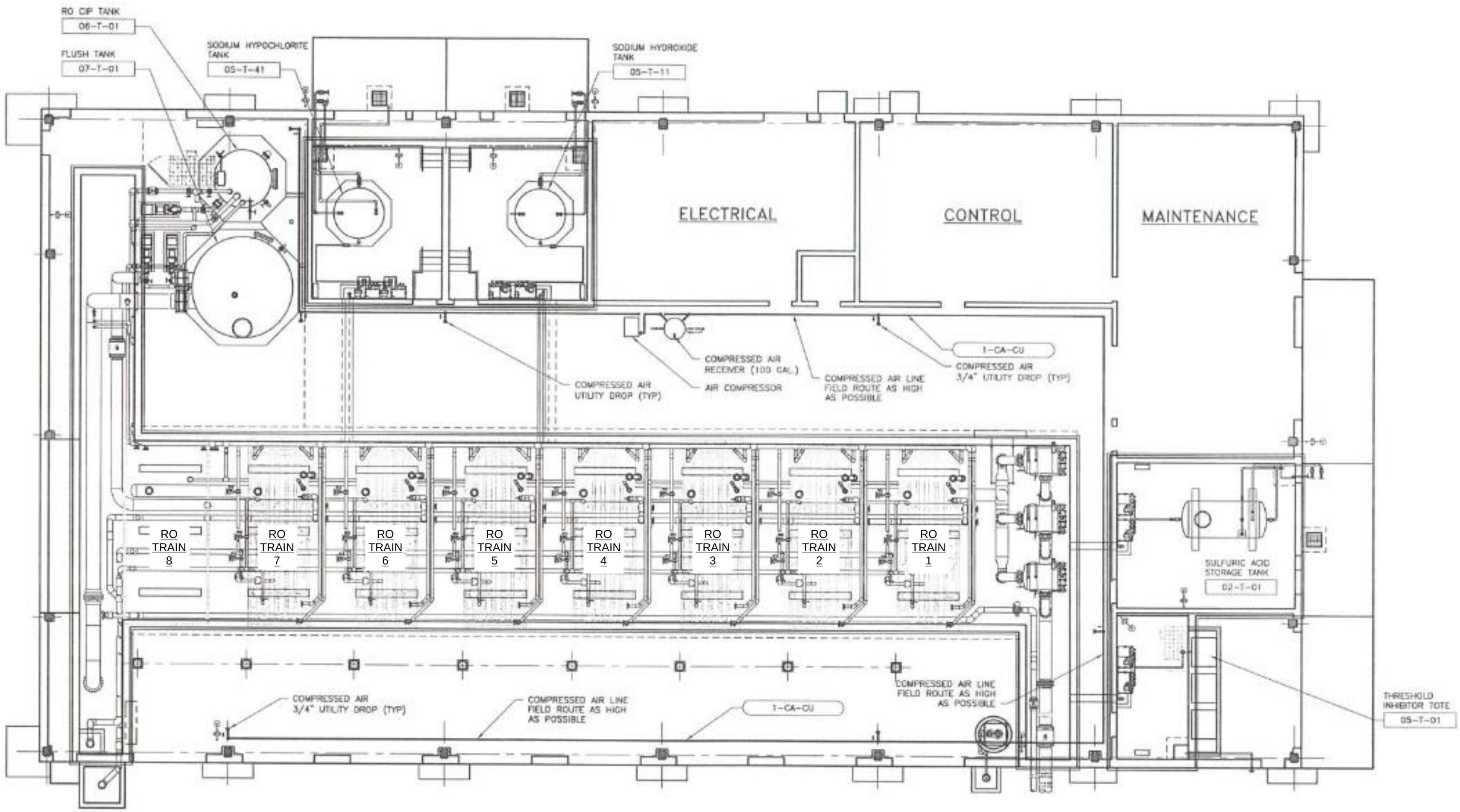

Figure 3-4: Conceptual Centralized RO Treatment System

In this concept, presented in Figure 3-4, all equipment would be housed in a pre-engineered metal building, with dimensions of approximately 175 feet by 90 feet. It is intended that similar sized RO trains be used and that the trains would be installed at each well site or that the wells be immediately routed to the centralized plant. The plant should include space for all required equipment including cartridge filters, reverse osmosis trains, high pressure pumps and chemical feed systems. Similar skidded equipment inside of a pre-engineered metal building is shown in FIG.

Figure 3-5: RO Equipment in a Pre-engineered Metal Building

Conceptually, the centralized RO treatment system can be housed at the Cleveland Street WTP. This location is relatively close to land that is available for new well production and also in a central location within the distribution system that can help to control water age in the system. Further evaluation is recommended during master planning to assess bottlenecks in the distribution system that will help manage water age and quality once the centralized RO system is online.

One key consideration for the RO treatment system is brine management. For the purpose for this evaluation, both deep well disposal and surface water discharge appear to be suitable options. There are currently five saltwater disposal wells located southwest of the City of Beeville. Typical disposal depth is 5,000 ft.

Poesta Creek and Aransas Creek may be suitable for RO concentrate discharge, since both creeks are slightly saline. Each site should be evaluated further with TCEQ as an alternative to disposal wells. Poesta Creek and Aransas Creek locations relative to the project site are illustrated in Figure 3-6.

Ultimately the City would benefit from deep well brine disposal, initially it is recommended that the City coordinate emergency brine discharge to one of the brackish streams to help provide emergency water to the City.

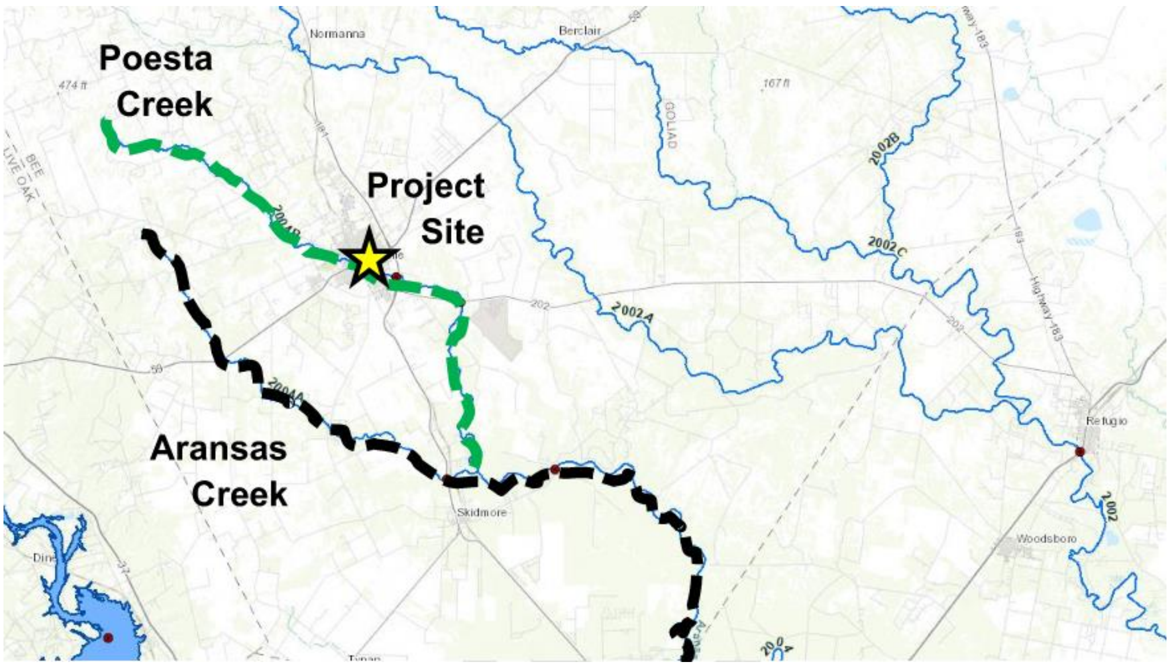

Figure 3-6: Potential High Salinity Surface Water Discharge Location

3.3.2 New Groundwater Wells

3.3.2.1 History and Background of the Gulf Coast Aquifer

The City is located on the Gulf Coast Aquifer, which is a significant groundwater source that stretches along the Gulf of Mexico and extends from the Louisiana border to the Mexico border. The extent of the Gulf Coast Aquifer in relation to Texas is shown in Figure 3-7. It is made up of multiple interconnected geologic units including the Chicot, Evangeline, and Jasper aquifers and the Burkeville and Catahoula confining units. The Catahoula confining unit is located at the base of the aquifer while the Burkeville confining unit separates the Jasper and Evangeline aquifers. Cross sections of the Gulf Coast Aquifer are shown in Figure 3-8. These formations consist of layered beds of sand, silt, clay, and gravel that vary in continuity along the Gulf Coast. The total thickness of the Gulf Coast Aquifer's sand deposits ranges from approximately 700 feet in the southern regions to around 1,300 feet in the north, with an average freshwater-saturated thickness of about 1,000 feet.

Groundwater in the Gulf Coast Aquifer is generally unconfined or semi-confined. The hydraulic conductivity of the Gulf Coast Aquifer increases from approximately 1 ft/day in the southern area of the aquifer to approximately 7 ft/day in the northeast area of the aquifer (Chowdhury et al., 2004). Similarly, transmissivity values vary across the aquifer, ranging from less than 1,000 ft^2/day in the south to over 14,000 ft^2/day in the northeast.

As many as 54 counties in Texas rely on the Gulf Coast Aquifer for at least a portion of their water supply. Larger water users throughout the area include, but are not limited to, the Cities of Houston, Galveston, Corpus Christi, and McAllen. The Gulf Coast Aquifer is also relied upon heavily to provide water for agricultural irrigation. Over pumping of the aquifer has occurred in high-demand areas, leading to aquifer depletion and subsequent compaction and land subsidence in some areas throughout the Gulf Coast. Documented changes in aquifer water level from 1995-2015 are shown in Figure 3-9. Compaction and subsidence have led to flooding and structural damage throughout impacted areas and other significant effects, such as saltwater encroachment and intrusion, have also been caused in part by over pumping.

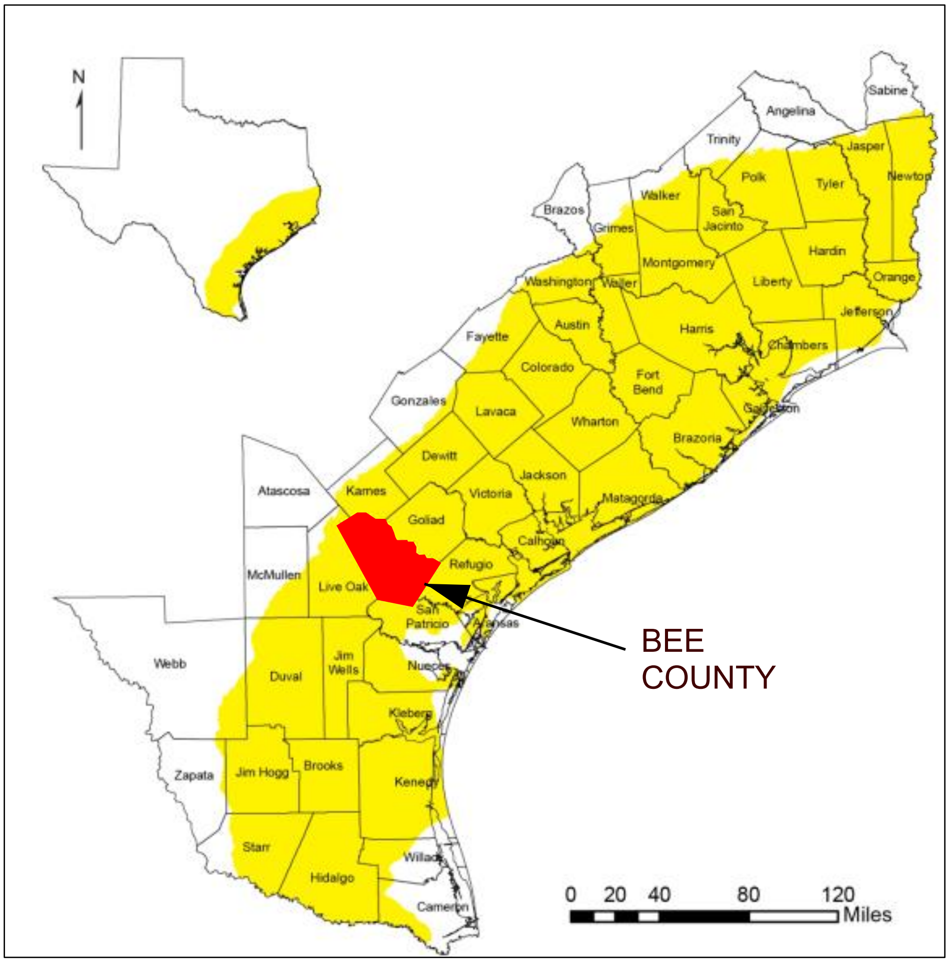

Figure 3-7: Extent of Gulf Coast Aquifer (Source: TWDB Texas Aquifers Study, 2016)

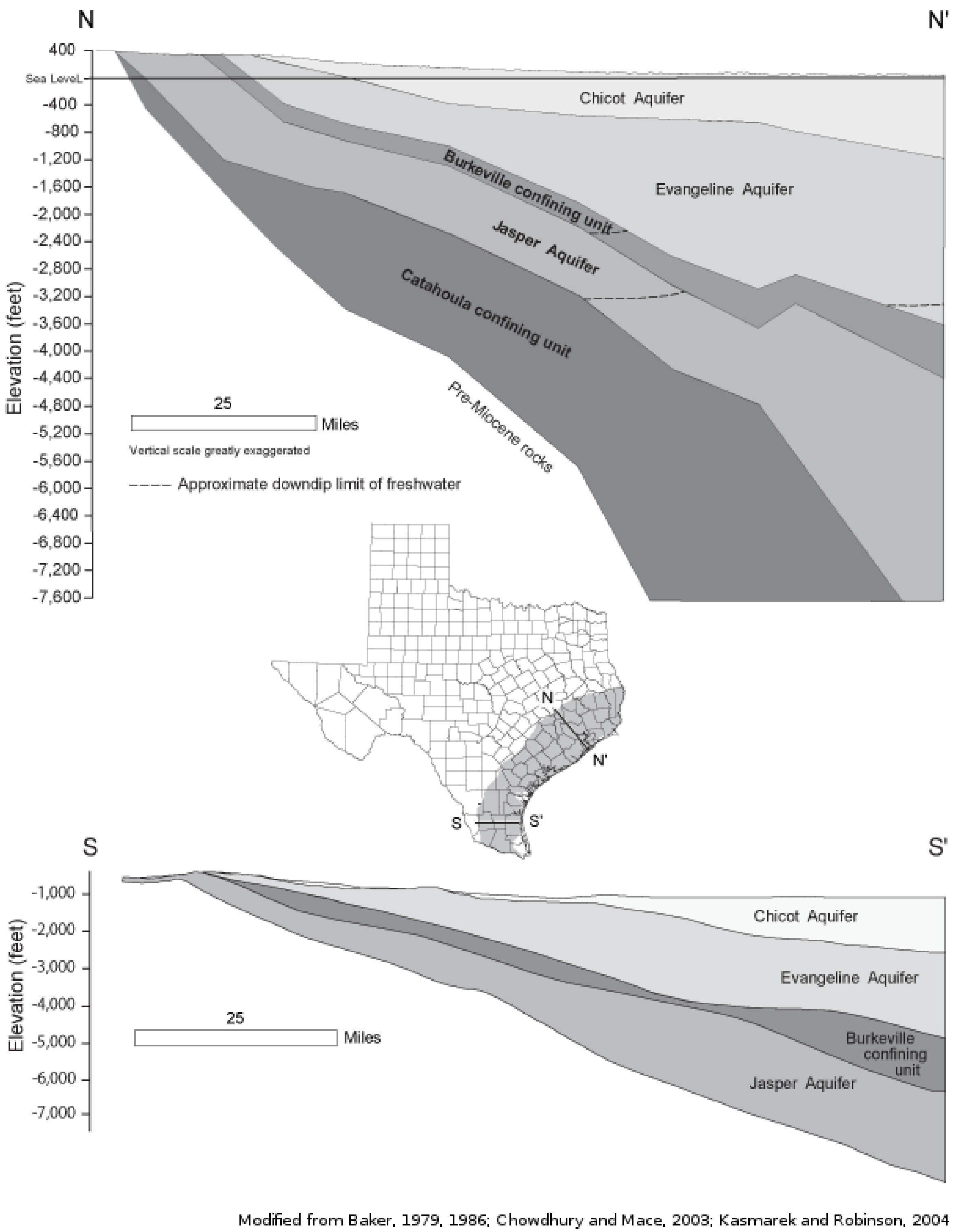

Figure 3-8: Cross-sections of the Gulf Coast Aquifer (Source: TWDB Texas Aquifers Study, 2016)

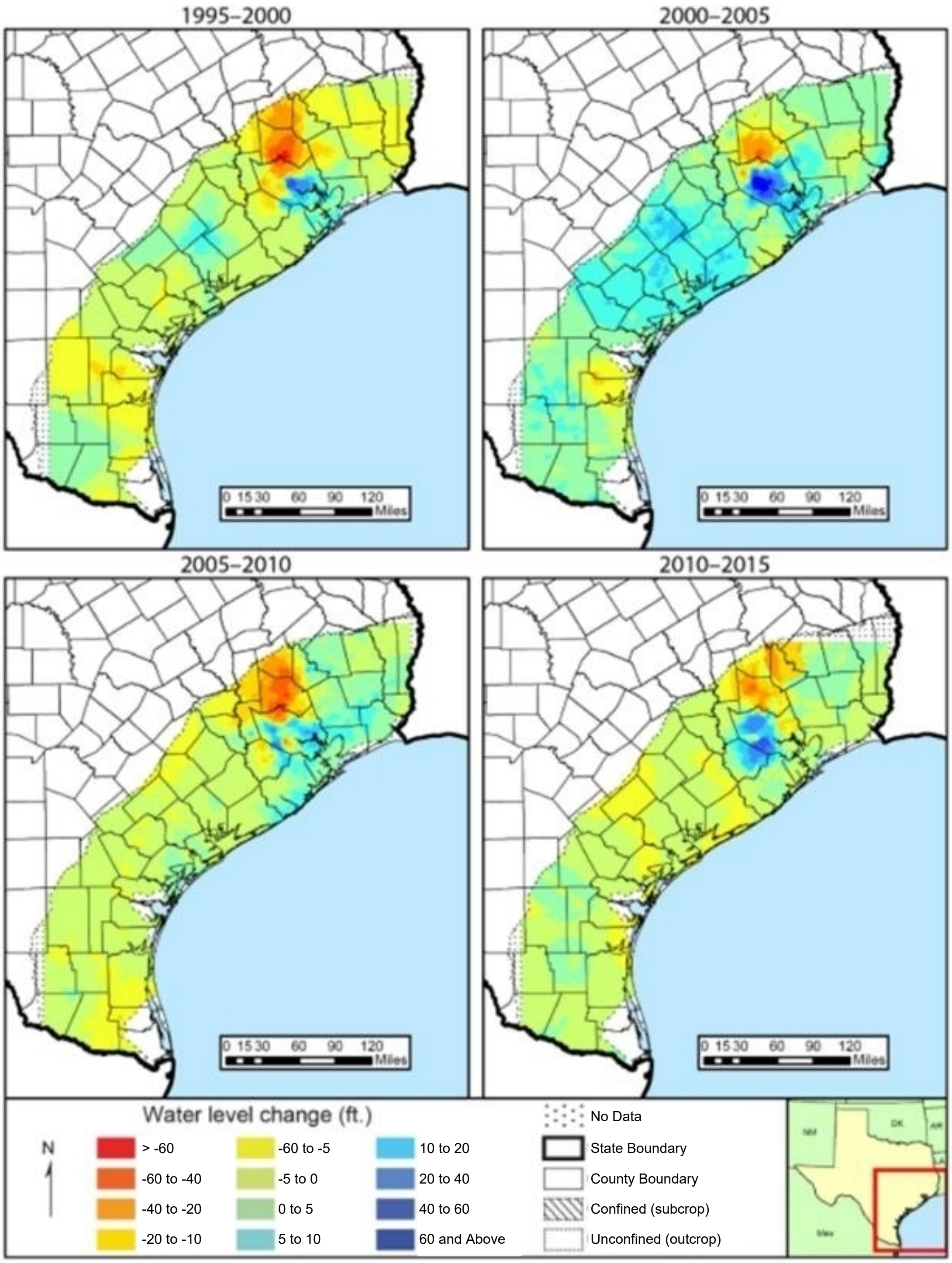

Figure 3-9: Changes in Gulf Coast Aquifer water level from 1995-2015 (Source: TWDB Texas Aquifers Study, 2016)

3.3.2.2 Gulf Coast Aquifer Water Quantity and Quality

Water quality in the Gulf Coast Aquifer generally tends to decline towards the southwest portion of the Gulf Coast due to saltwater intrusion, which can increase salinity and alkalinity, among other impacts. Total dissolved solids (TDS) levels in the aquifer range from 1,000 to over 10,000 mg/L as shown in Figure 3-10. Other parameters that have historically been found to exceed primary and secondary drinking water standards, predominantly in the southern region of the aquifer, include arsenic, radionuclides, chloride, iron, and manganese (Reedy and others, 2011). Many of these constituents are said to originate in the tuffaceous sands of the Catahoula Formation at the base of the Gulf Coast Aquifer but can then be mobilized into other areas of the aquifer along leaky fault zones and around salt domes (Adams and Smith, 1980; Reedy and others, 2011).

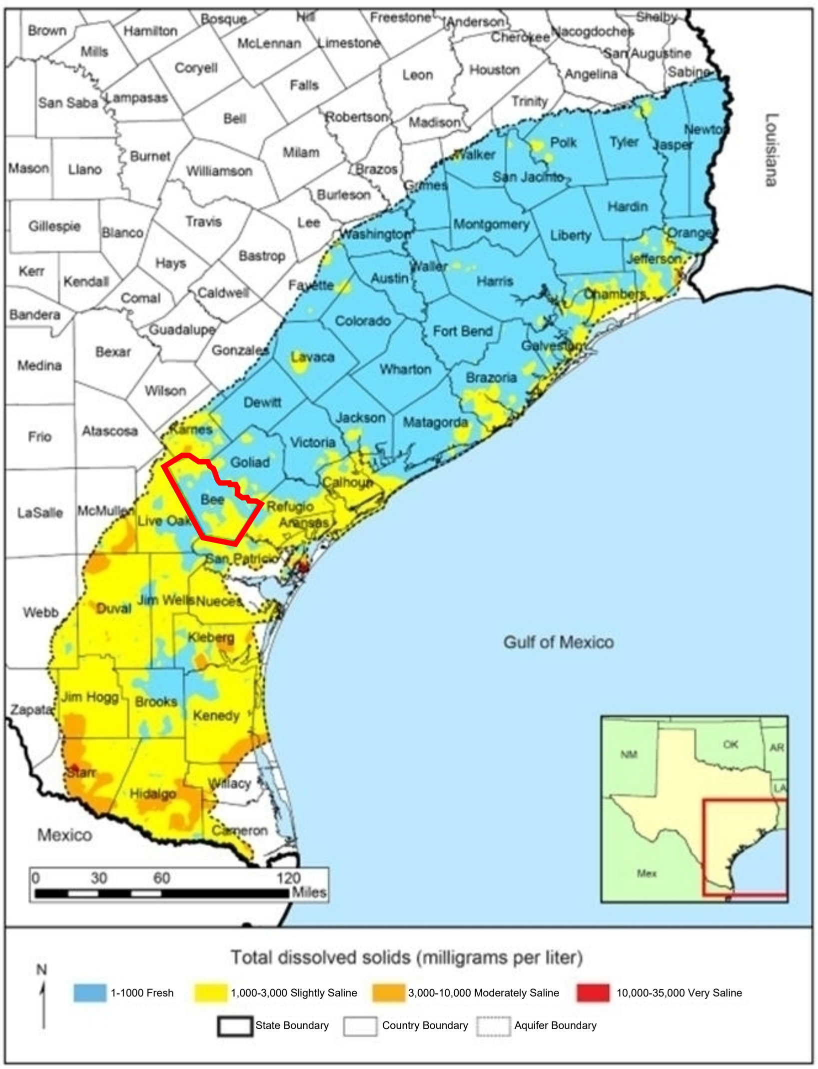

Figure 3-10: Total dissolved solids levels in the Gulf Coast Aquifer

3.3.2.3 Additional Considerations for New Well Sites

The history/background, water quantity, and water quality of the Gulf Coast Aquifer should be considered when identifying potential locations for new wells along with other factors like land availability and permitting. The Garver team performed a preliminary evaluation of new well sites that included development of new wells at Chase Field and at other sites that were available locally for development like the Welder R J Ranch LTP property. Currently, the costs of land, groundwater wells and conveyance from the new property to the City are anticipated to be competitive with the other alternatives. For these options, the water is ultimately controlled by local Groundwater Conservation Districts. The Welder property as an example would have the following key constraints from Bee Groundwater Conservation District that have been placed on development of the local groundwater resources:

- **Production Limitations:** Maximum of 10 gallons per minute per contiguous acres owned or operated. Additionally, the maximum yield of wells or well systems is 1 acre-foot of water per acre owned. Due to the yield limitations approximately 7,000 contiguous acres are needed to produce 6.3 MGD.
- **Well Spacing**: Wells may not be drilled within 100 feet of any property line and one foot of separation per gallon per minute of production capacity for wells less than 1,000 gpm. If the well design exceeds this capacity, the spacing requirement increases to 1.5 feet per gpm of capacity.
- **Production Permit Term:** Issued for periods of five years, can be terminated by Bee GCD after the expiration of the term.

These design and production requirements need to be addressed to ensure the long-term viability of this water source.

3.3.3 Wastewater Reuse

Potable reuse at the Moore Street WWTP will allow the city to recover around 2.5 MGD of purified water. There are multiple treatment approaches that can be used, but currently the fully advanced treatment process is the only treatment process that has been implemented in Texas potable reuse facilities. This treatment approach, which is illustrated in Figure 3-11, uses ultrafiltration, reverse osmosis and ultraviolet advanced oxidation process (UVAOP) to treat effluent from the wastewater treatment process.

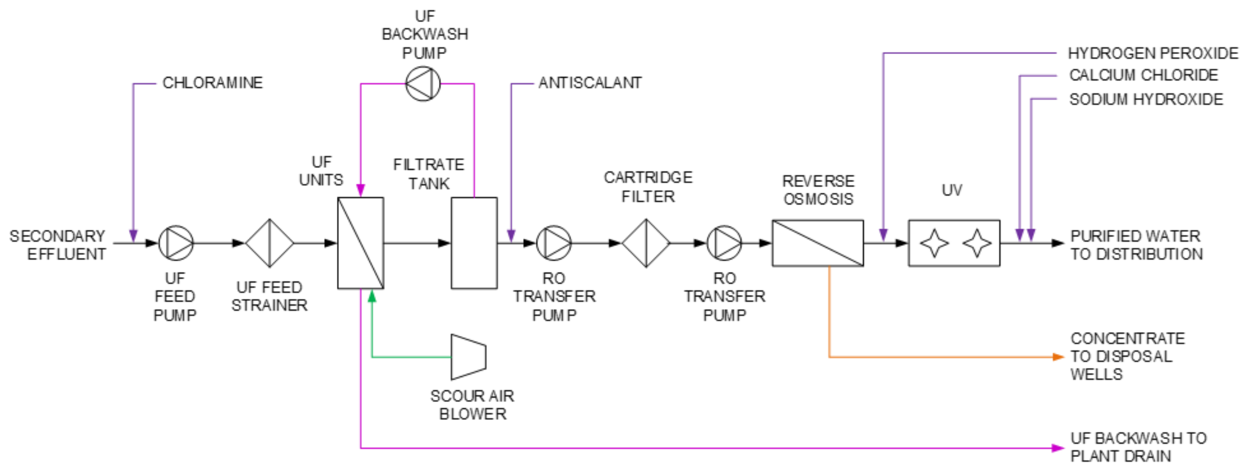

Figure 3-11: Conceptual FAT Treatment Process Flow Schematic

Recovered water can be pumped directly to the water distribution system with approximately 1.5 miles of new 12” conveyance pipeline required. A potential conveyance corridor is illustrated in Figure 3-12.

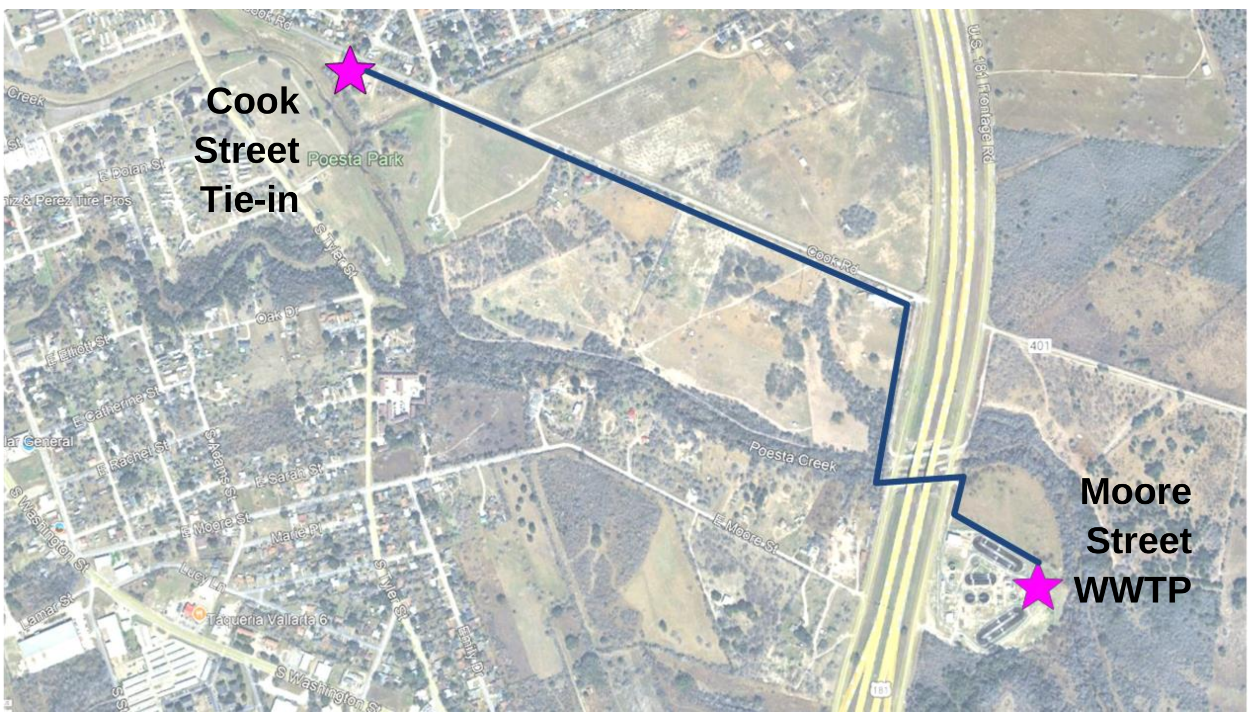

Figure 3-12: Conceptual Conveyance Route for DPR at Moore Street WWTP

An alternative to direct potable reuse (DPR) approach outlined above is indirect potable reuse, where purified water is introduced back into the potable water supply through an engineered buffer. Examples include surface water supply augmentation and groundwater augmentation. For the City of Beeville, Indirect reuse can be achieved through aquifer recharge, where excess purified is injected into the groundwater aquifer that the City is currently using. This approach requires less stringent treatment and disinfection validation but also is less efficient since the water must be pumped to the engineered buffer, recovered and treated again before use.

Because both approaches require a high level of treatment and innovative treatment systems, pilot testing will be required. The overall timeframe for development of this potable water source generally requires more time to develop than brackish groundwater and fresh groundwater supplies.

For potable reuse in City of Beeville, direct potable reuse is assumed to be the preferred approach.

3.3.4 Purchased Water Agreements

The City has multiple options for purchasing water to fulfill long-term needs as shown in Table 3-1. These include seawater desalination, public-private-partnerships for brackish groundwater RO, and buying water from local governments.

Table 3-1: Water Purchase Options

Alternative	Challenges	Advantages
Public Private Partnership	• Take-or-pay • Total Lifecycle Costs • Operational Inflexibility	• Third party mgmt. • Third party financing
Seawater Desalination	• Take-or-pay • Operational Inflexibility • Timeline / Uncertainty	• Third party mgmt. • Third party financing • Unlimited capacity

Two new water resources were identified through purchased water agreements, one with Seven Seas Water Group and one with Nueces River Authority.

3.3.4.1 Seven Seans Water Group

Seven Seas Water Group has proposed to build, own and operate a brackish groundwater treatment system for the City. Details of this agreement are still being negotiated and have not been provided to Garver. This opportunity is understood to be based on a take-or-pay contract with a unit cost of water that can be adjusted for future inflation. If this project moves forward, it is assumed that the City would allow Seven Seas Water Group to use existing brackish groundwater wells and develop groundwater available within city limits and under the control of City of Beeville.

3.3.4.2 Nueces River Authority

The Nueces River Authority proposes to develop a seawater desalination system located south of Beeville. The project, which is understood to be a take or pay agreement, can supply very large volumes of water through a new pipeline that would run up the I35 corridor. This new water supply could tie-into the existing surface water plant finished water conveyance system for delivery to the City.

4.0 Operational Considerations

The City currently uses contract operations to run the WTP and has limited access to local water treatment plant candidates. For this reason, staffing for the facility is being considered.

4.1 Staffing of Reverse Osmosis Facilities

Experiences from other RO facilities have shown that minimal operational support is needed for RO treatment systems, which run continuously and are fully automated. The operations team can be built gradually as the system is expanded.

The initial staffing plan is likely to include one supervisor and two plant operators for the well head RO phase of the project. The supervisor may be able to fill other roles for the City. An additional operator would be needed once the Brackish RO system is centralized and it is likely that the supervisor would need to focus on the Centralized RO plant. Afterwards, an additional operator may also be needed to help run the DPR system if implemented. For the centralized facility and DPR plant, a team of 5-6 plant operators is assumed to be sufficient, with 1 senior operator and the remainder of the team split into shift crews. General maintenance can be handled by the City's maintenance team or by third parties.

Texas Administrative Code (TAC) 30 TAC 290 Chapter D, Rule 290.46 does not specifically mention reverse osmosis treatment systems when assigning required operator certification. Generally, Class C certification is required for groundwater plants with greater than 1,000 connections and more advanced B certification may be required by TCEQ. Additionally, TCEQ requires that all reverse osmosis system operators have completed an approved 8-hour training program.

5.0 Infrastructure, Treatment and Cost Comparison

This section summarizes the Opinion of Probable Construction Costs (OPCC) and anticipated operating costs for the proposed projects.

5.1 OPCC Development

This OPCC was developed using construction cost estimating criteria and OPCC development guidelines as discussed in this section.

5.1.1 Construction Cost Estimate Criteria

The level of accuracy in cost estimating varies depending on the level of detail defining the project scope. The estimate herein is classified by AACE 18R-97 as a Class 5 estimate with an expected accuracy of -30% to +50%. For this report, the OPCC has been developed based on the facility and equipment layouts, process diagrams, and similar information compiled as part of the preliminary design. Table 5-1 summarizes the main assumptions adopted for the development of the OPCC.

Table 5-1: Conceptual Design OPCC Estimate Assumptions

Consideration	Assumption
Design Contingency	30%
Contractor Mobilization	5%
Contractor Overhead and Profit	20%

In the OPCC's contractor mobilization and contractor overhead and profit, mark-ups have been applied to the facility subtotals plus contingencies.

The pipeline conveyance costs are developed based on review of the Texas Water Development Board (TWDB) Uniform Costing Model Guidance prepared in March 2024, and local recent Corpus Christi bid tabs. The following unit cost assumptions were used for pipeline conveyance cost estimates:

- Rural Pipeline - $20/diam-inch/linear foot
- Urban Pipeline - $30/diam-inch/linear foot
- Tunnel Pipeline - $80/diam-inch/linear foot

Easement procurement costs for the raw and treated water pipelines assumed $50,000/acre and a 30 ft permanent easement width.

5.1.2 OPCC Development Guidelines

The preliminary design OPCC has been prepared based upon the following guidelines:

- The OPCC has been structured by preparing an individual estimate for each facility.
- Each facility area includes costs assigned to contractor mobilization, contractor overhead and profit, and adopted estimating contingency for unidentified work.
- Excavation and backfill costs required for each facility area are assigned to that area.
- Electrical and instrumentation costs are assigned directly to each facility area's overall costs.

The development of the adopted unit prices incorporated costing knowledge obtained from several sources that include:

- Previous cost estimates prepared by the design team
- Contractor bid tabulations from recent project deliveries
- Cost estimating guides provided by nationally recognized cost estimating organizations

5.2 Summarized Capital Costs

OPCC's were developed based on the methodology proposed above and are summarized in Table 5-2.

Table 5-2: OPCC Summary by Water Supply Project ($M)

Cost Item	Well Head RO (3 MGD)	Central RO (6 MGD)	Direct Potable Reuse (3 MGD)	Welder Ranch (6.2 MGD)	Nueces River Authority (6 MGD)	Seven Seas (6 MGD)
Wells	4.0	7.5		30.0		
Raw Conveyance		6.4		6.3		
TW Conveyance	0.9		2.0	16.9		
Treatment						
WWTP Rehab			5.0			
Site Civil	2.5	2.5	1.5	5.0		
Process Building	0.8	4.0	4.5			
Membrane Filter			4.5			
RO System	4.5	3.0	4.0			
UVAOP System			2.4			
Chemical Feed	0.6	1.1	1.5	0.3		
Plant Electrical	2.2	3.2	3.9			
Finished Water	1.8	2.5	2.5	2.5		
Brine Disposal			10.0			
Subtotal	**17.3**	**30.2**	**41.8**	**61.0**	**0.0**	**0.0**
Contingency	5.2	9.1	12.5	18.3	0.0	0.0
Mobilization	0.9	1.5	2.1	3.0	0.0	0.0
Contractor OH&P	3.5	6.0	8.4	12.2	0.0	0.0
Total	**26.8**	**46.8**	**64.8**	**94.5**	**0.0**	**0.0**

The costs presented are for full projects in Table 5-2. In some cases, for example the centralized reverse osmosis project, the costs are assumed to be substantially lower if the well head RO project were undertaken first. In this type of scenario, the reverse osmosis systems would be relocated to the centralized facility and most of the groundwater well costs for the rehabbed wells and new wells needed during the well head project could be deducted from the total project costs.

5.3 Capital Cost and Life Cycle Cost Comparison

Life cycle costs were evaluated to compare each water supply alternative and the feasibility of the alternatives as summarized in Table 5-3.

Table 5-3: OPCC Summary by Water Supply Project ($M)

Project Phase	Water Rights Purchase	CAPEX	Initial Annual OPEX	Levelized Annual OPEX	30-Year NPV	Book Value of City Assets	Time to Implement (Months)
Well Head RO Treatment (3 MGD)		$26.8M	$2.1M	$6.3M	$122.0M	$26.8M	6-12
Centralized Brackish RO (6 MGD)		$77.4M	$3.4M	$13.9M	$272.4M	$77.4M	24-36
Direct Potable Reuse (3 MGD)		$64.8M	$3.2M	$12.2M	$238.4M	$64.8M	36-60
Welder J R Ranch LTD	$50M[3]	$94.5M	$4.0M	$22.4M	$439.6M	$94.5M	24-48
Nueces River Authority (6 MGD)1		$0	$26.3M	$40.3M	$788.4M	$0	60+
Seven Seas Water Group (6 MGD)		$0	$12.0M	$18.5M	$361.4M	$0	12-24

Table Notes:
1. Nueces River Authority option will see purchase water price escalation. Initial annual O&M costs of roughly $26M increases to $64M over the 30-year planning window.
2. Seven Seas option will see purchase water price escalation. Initial annual O&M of roughly $12M increases to $28.4M over the 30-year planning window.
3. The water rights purchase price is assumed based on other water rights costs reported regionally.

Levelized water rates were developed from the net present value costs. The levelized water rates are presented in Table 5-4.

Table 5-4: Water Purchase Options – Levelized Water Rate

Project Phase	Initial Water Rate ($/Kgal)	Levelized Water Rate ($/Kgal)
Well Head RO Treatment (3 MGD)	$3.42	$5.69
Centralized Brackish RO (6 MGD)	$3.72	$6.35
Direct Potable Reuse (3 MGD)	$6.54	$11.10
Welder Ranch	$5.90	$10.40
Nueces River Authority (6 MGD)1	$12.00	$18.37
Seven Seas Water Group (6 MGD)	$5.50	$8.42

Based on life cycle cost estimates, the cost of the well head and centralized brackish water RO projects are the lowest overall cost alternatives. The development of the Welder R J Ranch LTD water supply project is the next lowest cost option, followed by direct potable reuse and then the purchased water options.

Development of brackish groundwater is recommended as the highest priority. Development of local groundwater at the Welder Ranch and Direct Potable Reuse are recommended for secondary development. Groundwater from the Welder Ranch is controlled by the Bee Groundwater Conservation District, which can reduce the available supply of water in response to drought or neighboring users, and the cost evaluation is very sensitive to treatment needs. The salinity is presently assumed to be fresh, like the Chase Well Field, however if the salinity of this groundwater is comparable to current City owned groundwater wells, then the cost of treatment and associated NPV would be significantly higher than the potable reuse option. Because of the risk associated with supply availability and potential impacts of groundwater quality, development of potable reuse is recommended as the secondary alternative.

6.0 Project Funding

Multiple options were evaluated to help the City compare potential funding alternatives and strategies.

6.1 Funding Considerations

There are numerous scenarios to consider when identifying and pursuing funding opportunities based on the City's project timing, financial capacity, and priorities, among other factors.

It is critical to note that projects funded by federal programs and/or appropriations may be subject to certain federal requirements such as the Davis-Bacon Act prevailing wage provision, NEPA-level environmental reviews, generally accepted accounting principles, Cost and Effectiveness Analyses (for municipality or intermunicipal, interstate, or state agencies only), AIS, Build America, Buy America (BABA), Fiscal Sustainability Planning, and DBE program requirements throughout the life of the project.

Additionally, there are requirements for procurement of engineers and other contractors that vary based on program type. Generally, federally-funded programs will have the strictest procurement requirements to ensure transparency, fairness, and compliance with federal regulations. These requirements include, but are not limited to:

- Most programs require the use of qualifications-based selection (QBS) for engineering and other services, consistent with the federal Brooks Act model.
- Procurement must be conducted through a publicly advertised RFQ or RFP, using clearly defined evaluation criteria based solely on qualifications.
- Cost proposals are negotiated only after the most qualified firm is selected.
- All solicitations and contracts must comply with 2 CFR Part 200, including provisions for civil rights, debarment, lobbying restrictions, and equal opportunity.
- Recipients must also take affirmative steps to engage DBEs and minority- and women-owned firms (MBEs/WBEs), with appropriate documentation of outreach efforts.

- Robust recordkeeping is required throughout the procurement process, including justification of method, scoring, and contract award details.
- Policies must be in place to prevent conflicts of interest, and procurement activities must remain free from undue influence.
- Failure to follow these procurement requirements can result in ineligibility for reimbursement or loss of federal funding.

Applicant and project characteristics are the main eligibility determinants for most water funding programs. When determining likelihood of funding for various programs, these characteristics can provide a better understanding of how well an entity's project aligns directly with a particular funding program's priorities. At this time, Beeville's annual median household income, population, unemployment rate, and adjusted per capita income, among other characteristics, make it eligible for potential principal forgiveness or grant funding based on the current qualification criteria. Most state funding programs that include potential principal forgiveness are currently reserving these categories of funds for entities that are under a certain population, disadvantaged, or have projects with urgent need and/or green components.

6.2 TWDB DWSRF Program

TWDB is the State of Texas's leading agency to offer funding opportunities when it comes to ensuring a secure water future for the state and its citizens. Among other functions, one of the TWDB's main goals is to provide cost-effective loans and grants for the planning, acquisition, design, and construction of water and wastewater-related infrastructure.

One of the TWDB's most popular programs available to fund water projects is the Drinking Water State Revolving Fund (DWSRF) Program, which is authorized by Section 1452 of the Safe Drinking Water Act (SDWA) and offers opportunities for both federal (equivalency) and state (non-equivalency) funding. The DWSRF offers low-cost loans with below-market interest rates and potential loan forgiveness for water projects across Texas.

6.2.1 DWSRF Eligible Entities and Project Types

Eligible applicants for the DWSRF Program include publicly and privately-owned community water systems, including nonprofit water supply corporations and nonprofit, non-community public water systems. Eligible project types include:

- Correcting water system deficiencies including water quality, capacity, pressure, and water loss
- Upgrading or replacing water systems
- Providing new or existing service to other water systems through consolidation projects
- Purchasing capacity in water systems
- Purchasing water systems
- Implementing green projects (pursuant to EPA guidance)
- Implementing source water protection projects

6.2.2 DWSRF Solicitation and Ranking Process

Solicitation for the DWSRF opens in December of each year and closes in March of the following year. Eligible entities must submit a completed Project Information Form (PIF) by the deadline to be invited to apply for funding under the initial Intended Use Plan (IUP) for the upcoming fiscal year. A PIF may be submitted at any time, however, it will not be included for review in the initial TWDB Project Priority List (PPL) if it is not submitted by the solicitation deadline. The DWSRF Program's solicitation and ranking process is further detailed in Figure 6-1.

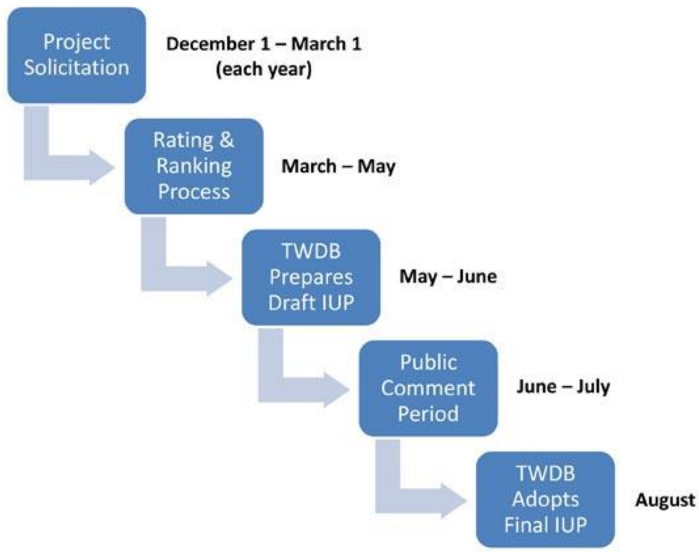

Figure 6-1: TWDB DWSRF Solicitation and Ranking Process Timeline

6.2.2.1 SFY 2027 PIF Deadline and Rating Criteria

To be included in the initial PPL for SFY 2027, an entity must submit a completed PIF during the Project Solicitation period that is anticipated to end during the first week of March 2026. PIF submissions to TWDB are subject to a rate and ranking process to determine placement on the DWSRF's PPL. The PPL is the document used by the TWDB in extending an invitation to apply for funding under the initial IUP each fiscal year. The current project ranking criteria is outlined below.

- Combined rating, health and compliance, and primary compliance factors
- Secondary compliance factors
- Physical deficiency factors
- Consolidation factors
- Effective management

- Disadvantaged eligibility
- Previously received TWDB planning, acquisition, or design funds

6.2.3 DWSRF Application Process

After the solicitation and ranking process, invitations to apply are distributed accordingly. Formal applications are then prepared and submitted to the TWDB for review. After submittal and review, applications are then recommended to the Board for approval and the loan closing process occurs. The DWSRF Program's process timeline is further detailed in Figure 6-2.

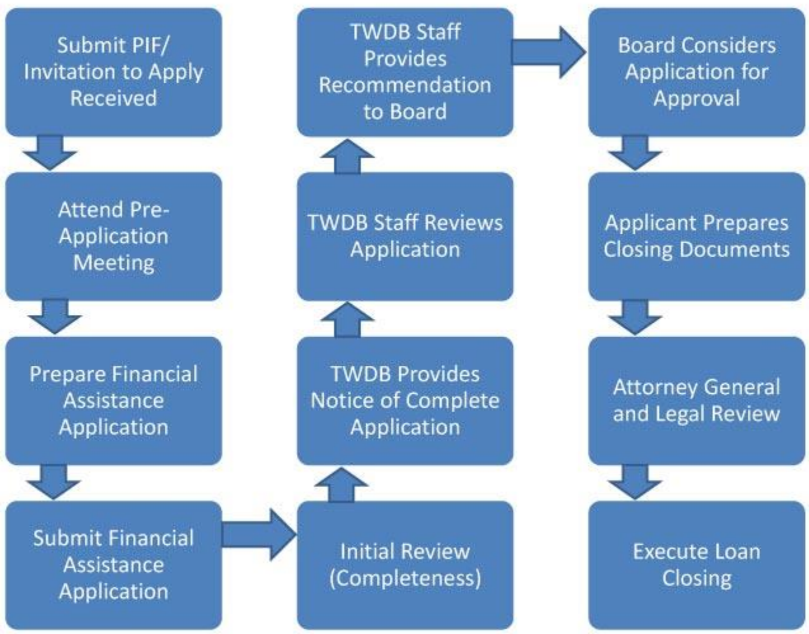

Figure 6-2: TWDB DWSRF Program Application Process

6.2.4 DWSRF Program Requirements

The DWSRF Program includes a loan origination fee that can be financed by the DWSRF Program as an eligible project cost. The loan origination fee was equal to 2.0% of the total funding for SFY 2025; it is anticipated to remain at 2.0% for the current SFY 2026 Funding Cycle and will be confirmed upon release of the annual IUP. Other program requirements are as follows:

- NEPA-type Environmental Review
- State Water Plan Consistency
- Water Conservation & Drought Plans
- Davis-Bacon Wage Rates
- American Iron and Steel (AIS) / Build America, Buy America (BABA) Compliance

- Water Loss Threshold Review
- Water Use Survey Submission
- FMT Capacity Assessment
- DBE Program Compliance

6.2.5 DWSRF Program Benefits and Limits

The DWSRF Program offers a range of significant benefits including access to low-interest loans that substantially reduce borrowing costs compared to traditional financing. The program allows extended repayment terms of up to 30 years, and up to 40 years for disadvantaged entities. Borrowers can combine DWSRF funds with other state and federal programs, such as USDA or WIFIA, for maximum leverage. Additional benefits include technical assistance for small systems, no prepayment penalties, and specific incentives for projects that promote system consolidation or regionalization, supporting long-term sustainability and public health outcomes.

The maximum loan/bond commitment amount a project may receive was $49 million under the SFY 2025 IUP; maximum commitment amounts for SFY 2026 will be determined in the next IUP. Lastly, the maximum loan forgiveness amount that may be committed to a project under the SFY 2025 IUP from all funding options is $10,000,000 for projects serving disadvantaged communities. Projects under projects are eligible for up to 70% of project costs with a maximum of $10,000,000.

6.3 TWDB SWIFT Program

The State Water Implementation Fund for Texas (SWIFT) Program is a financing program administered by the TWDB to support the implementation of the state’s water supply strategies. Established by the Texas Legislature in 2013 with a $2 billion transfer from Texas’ Economic Stabilization Fund (also known as the Rainy-Day Fund), SWIFT provides low-cost, long-term financial assistance to political subdivisions and nonprofit water supply corporations for projects included in the State Water Plan. The program is designed to help ensure Texas meets its future water needs through efficient and affordable infrastructure investment.

6.3.1 SWIFT Eligible Entities and Project Types

Eligible applicants for the SWIFT Program include municipalities, counties, river authorities, water improvement and control districts, irrigation districts, groundwater conservation districts, and special law districts. Nonprofit water supply corporations are also eligible. All applicants must be political subdivisions or nonprofit water entities located within Texas.

To qualify for SWIFT funding, projects must be recommended water management strategy projects (WMSPs) with a non-zero capital cost, as listed in the most recently adopted Texas State Water Plan. Eligible project types include water conservation and reuse initiatives, groundwater or seawater desalination, construction of new pipelines, development of reservoirs or well fields, and acquisition of water rights. Only components explicitly identified in the WMSP are eligible for funding—any unlisted elements, even if related, are not eligible under SWIFT.

6.3.2 SWIFT Application and Prioritization Process

The SWIFT funding cycle begins with the submission of abridged applications. Solicitation typically opens in December and closes the first week of February on an annual basis. These applications are reviewed and prioritized at both the regional and state levels based on statutory criteria outlined in Texas Administrative Code §363.1303–1304. High-priority projects are then invited to submit full financial applications. Final funding commitments are made following TWDB's comprehensive financial and engineering review. A summary of the SWIFT Program's funding process is detailed in Figure 6-3.

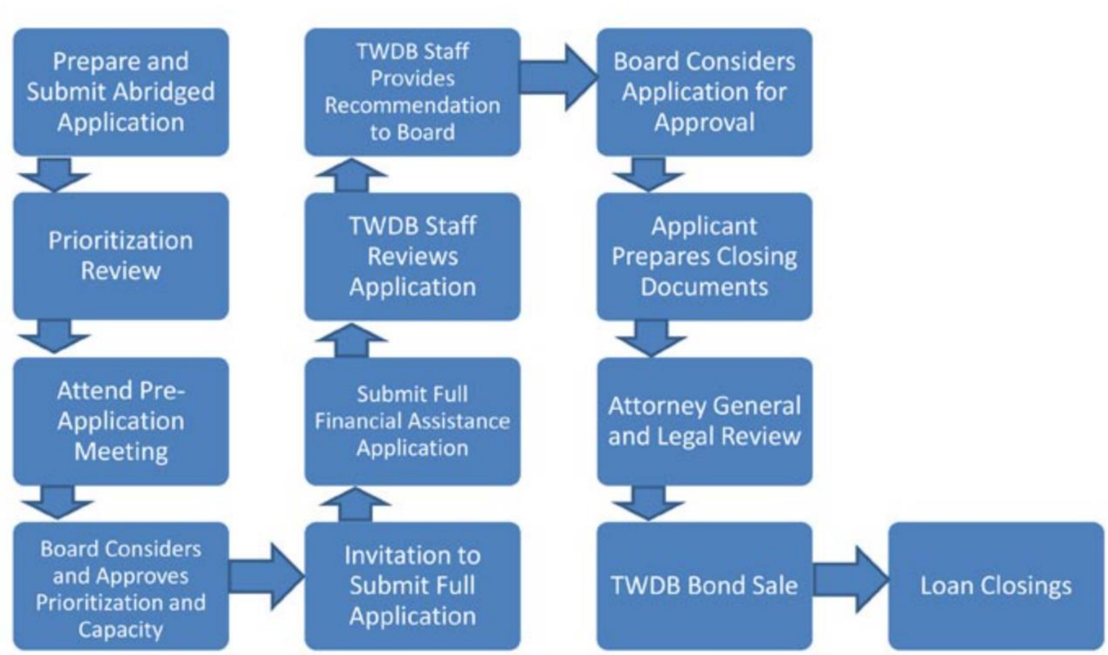

Figure 6-3: SWIFT Program Process Overview

6.3.3 SWIFT Program Requirements

The SWIFT program is state-funded and main programmatic requirements include:

- Projects must be recommended water management strategy projects with an associated capital cost in the adopted regional and state water plans at the time abridged applications are due to the TWDB for consideration
- State-level environmental review
- Entities receiving assistance over $500,000 must adopt water conservation and drought contingency plans
- Financing agreement and private placement memorandum
- Historically Underutilized Business (HUB) reporting
- Meet U.S Iron and Steel requirements
- Review of legislative requirements regarding water loss threshold limits

- Entities with at least one public rating from a nationally recognized statistical rating agency may not discontinue the rating issued until their SWIFT obligations are retired or no longer held by the TWDB

6.3.4 SWIFT Program Benefits and Limits

The SWIFT program offers highly competitive financing terms designed to reduce the overall cost of borrowing for water infrastructure projects. One of the program's primary financial advantages is its ability to offer interest rates that are significantly below market levels, supported by the TWDB’s AAA bond rating. Additionally, rural and agricultural water conservation projects may qualify for further interest rate subsidies.

SWIFT loans offer repayment terms of up to 30 years or the useful life of the project, whichever is shorter. The SWIFT Program allows for the deferral of both principal and interest payments for up to eight years or until the project’s completion. The program does not currently have a maximum funding limit and also offers multi-year commitments for projects. An additional financing option available through SWIFT is the Board Participation structure, in which TWDB can temporarily acquire up to 80% of a project’s capacity. This approach allows applicants to incrementally repurchase capacity over time, easing initial financial burdens and supporting phased implementation of larger projects.

The SWIFT Program’s features collectively it a flexible and cost-effective option for entities seeking to implement State Water Plan projects. The combination of low interest rates, deferral options, and innovative ownership structures provides significant long-term financial benefits for applicants.

6.4 TWDB DFund Program

The Texas Water Development Fund (DFund), established by the Texas Legislature in 1957, is a state-funded loan program administered by the TWDB. It provides financial assistance for a wide range of water-related infrastructure projects across Texas including water supply, wastewater treatment, and flood control. Unlike federally-funded programs, the DFund uses state bond proceeds, allowing borrowers to access capital without triggering federal cross-cutting requirements. One of the key features of DFund is its flexibility because it allows multiple project types (e.g., water and wastewater) to be bundled into a single financing package, simplifying project coordination and administration.

6.4.1 DFund Eligible Entities and Project Types

Eligible applicants include political subdivisions such as cities, counties, water districts, and river authorities. These entities typically qualify for tax-exempt financing. Nonprofit water supply corporations are also eligible, though they may only receive loans at taxable interest rates. The DFund can finance a broad spectrum of project types including water supply, wastewater, and flood control.

6.4.2 DFund Application Requirements and Process

Accessing funding through the DFund Program begins with a pre-application meeting involving TWDB regional project staff, the applicant’s governing body, their engineer, financial advisor, and bond counsel.

This collaborative step ensures alignment on project scope, readiness, and financing strategy. Applicants then submit a formal online loan application that includes an engineering feasibility report (EFR), environmental documentation, audited financials, and related materials. TWDB will then conduct an environmental review before any construction funds are released. Construction disbursements are milestone-based and require approval of plans and specifications, environmental clearance, and a Certificate of Approval (COA) issued by the Texas Commission on Environmental Quality (TCEQ).

6.4.3 DFund Program Requirements

DFund programmatic and compliance requirements include:

- Projects must be consistent with the current Texas State Water Plan
- Applicants must submit a Water Conservation Plan and Drought Contingency Plan for projects receiving more than $500,000
- Applicants must prepare a Water Loss Audit if their system’s water loss exceeds the allowable threshold
- While the DFund does not mandate all federal requirements, TWDB does require compliance with state-level procurement, environmental, and engineering standards
- Regular inspections, change order reviews, and financial monitoring are conducted by TWDB staff throughout the project life cycle

6.4.4 DFund Program Benefits and Limits

DFund loans are offered at long-term, fixed interest rates based on the TWDB’s cost of funds. Repayment terms typically range from 20 to 30 years for construction projects, and up to 10 years for planning and design-only projects. There is no formal cap on the amount a borrower may request, though funding awards are subject to Board approval and the availability of program resources. Because the DFund is state-based, funded projects are not subject to federal conditions such as Davis-Bacon wage requirements or American Iron and Steel (AIS), unless federal funds are blended into the project.

6.5 EPA WIFIA Program

The WIFIA Program is administered by the United States Environmental Protection Agency. It provides long-term, low-cost supplemental loans for regionally and nationally significant infrastructure projects. This program is competitive, designed to provide significant cost savings to borrowers and their customers. While the WIFIA Program offers flexible financing, it will cover up to 80% of eligible project costs for small communities with populations under 25,000.

Eligible applicants include municipalities, water districts, river authorities, regional water providers, and nonprofit water supply corporations with recommended water supply strategies in the most recent State Water Plan. Qualifying projects may involve new or expanded infrastructure such as pipelines, reservoirs, desalination facilities, groundwater development, water reuse, conservation, and interconnectivity projects. All projects must address long-term water supply needs and be included in the regional water planning group's adopted plan.

6.5.1 Process Timeline

The WIFIA Loan Process has three main phases – project selection, project approval, and project monitoring – with several steps included as part of each phase.

6.5.2 Phase 1: Project Selection

The project selection phase of the WIFIA process is detailed in Figure 6-4.

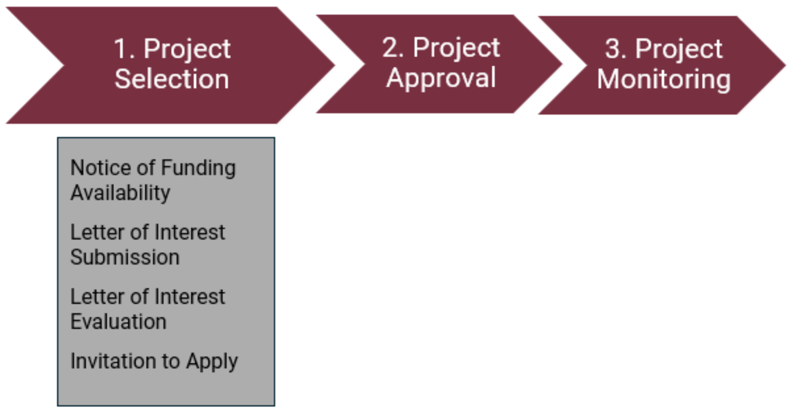

Figure 6-4: Project Selection Phase and Associated Steps

Each year, the WIFIA Program receives an appropriation that replenishes the amount of funding that can be made available to prospective borrowers. With that appropriation, EPA also announces priorities that help the WIFIA Program support the agency's mission and strategic goals. EPA announces this funding in a Notice of Funding Availability. Funding is currently available and Letters of Interest from prospective borrowers are being collected.

Letters of Interest (LOI) provide information that EPA uses to determine the project's eligibility, creditworthiness, engineering feasibility, and alignment with EPA's policy priorities. Based on these reviews, EPA selects projects which it intends to fund and invites them to continue to the application process.

6.5.2.1 LOI Rating Criteria

In the LOI, prospective borrowers provide the WIFIA Program with enough information to:

- Validate the eligibility of the prospective borrower and the proposed project
- Perform a preliminary creditworthiness assessment
- Perform a preliminary engineering feasibility analysis
- Evaluate the project against the selection criteria defined in the Notice of Funding Announcement (NOFA)

EPA determines if the project has an appropriate level of environmental readiness at the time of LOI to reasonably complete an environmental review.

The WIFIA selection criteria are divided into three categories that represent critical considerations for selecting projects. These categories include borrower creditworthiness, project readiness, and project impact.

6.5.3 Phase 2: Project Approval

The project approval phase of the WIFIA process is detailed in Figure 6-5.

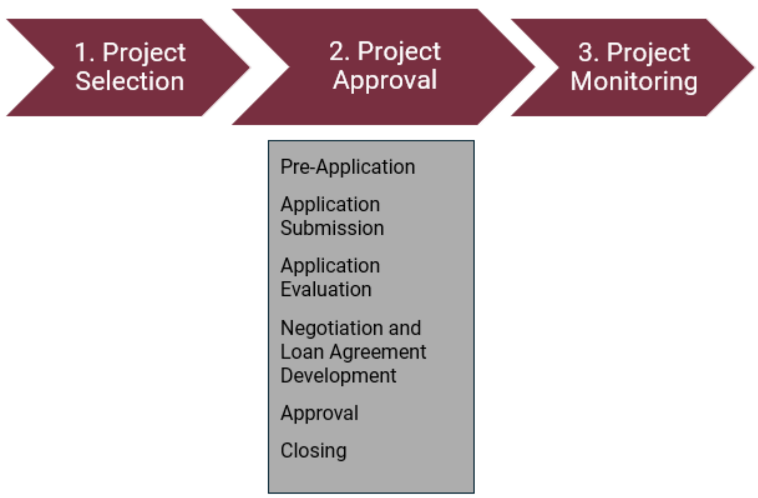

Figure 6-5: Project Approval Phase and Associated Steps

Each invitee must submit an application for WIFIA credit assistance. Using this information, the WIFIA Program conducts a detailed evaluation of the project. EPA proposes terms and conditions for the project and negotiates with the applicant until they develop a mutually agreeable term sheet and loan agreement. Prior to closing, the WIFIA Program must receive approval from the EPA Administrator or his designee and the Office of Management and Budget (OMB). At closing, EPA and the applicant execute the term sheet, which obligates the WIFIA funds, and the loan agreement, which is the binding legal document that allows the borrower to receive WIFIA funds.

After the WIFIA Program notifies the prospective borrower that they are invited to apply, the prospective borrower will begin working with a member of the WIFIA origination team, who is the primary point of contact until application submission. The origination team member schedules an introductory call to discuss the project, explain the WIFIA application process, and answer any questions. The prospective borrower will also provide the origination team member with a timeframe for when they plan to submit the application. The member of the origination team will collaborate with the prospective borrower before the application submission to ensure a successful outcome.

After receiving a complete application, the WIFIA Program assigns a transaction team consisting of an underwriter, engineer, environmental reviewer, attorney, and risk manager to evaluate the transaction.

This transaction team conducts financial, technical, and environmental reviews of the project, the applicant, and the applicant's financing framework. The WIFIA Program may retain the services of financial advisors, outside legal counsel, and engineering firms during the application evaluation through closing.

Applicants are required to provide both a preliminary and final credit rating letter from a Nationally Recognized Statistical Rating Organization (NRSRO). The preliminary rating opinion letter is a credit assessment from an NRSRO that provides a preliminary indication of the project's overall creditworthiness and specifically addresses the potential of the project's senior debt obligations to achieve an investment-grade rating and the default risk of the WIFIA loan. Since the indicative rating is performed at an early stage of application, the credit analysis is not expected to include comprehensive information about the loan structure but should provide an opinion about the potential to reach a credit rating based on a set of assumptions.

6.5.3.1 Application Next Steps

For an application to proceed to evaluation, the applicant must pay the application down payment, provide the preliminary rating opinion letter from a NRSRO, and submit a signed application. The WIFIA Program will confirm that the application continues to meet the eligibility requirements.

6.5.4 Phase 3: Project Monitoring

The project monitoring phase of the WIFIA process is detailed in Figure 6-6.

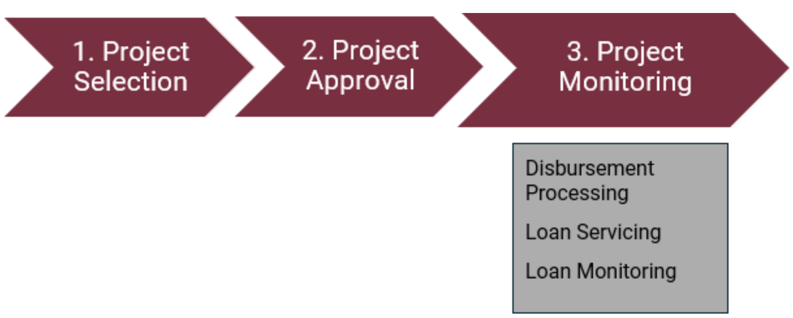

Figure 6-6: Project Monitoring Phase and Associated Steps

Following loan closing, borrowers must meet several requirements to receive funding and remain in compliance with the loan agreement. There are three main categories of project monitoring activities: disbursements, loan servicing, and loan monitoring. The executed loan agreement will identify specific requirements pertaining to each credit instrument. Each borrower is assigned a Portfolio Manager, who is their point of contact following closing.

Prior to any disbursement, all conditions precedent to funding must be satisfied. The borrower may begin submitting eligible project costs for reimbursement following closing.

The WIFIA Program monitors the loans in its portfolio using three key functions: credit risk monitoring, compliance management and monitoring, and program evaluation.

These functions assess different borrower or program characteristics and are each an essential part of the WIFIA Program's loan monitoring activities.

6.5.5 WIFIA Financing Costs

The following can costs be financed by the WIFIA loan as eligible project costs. These costs vary based on an applicant's size:

- Application Down Payment: $25,000 payable upon submission of the application. This application down payment goes toward any external counsel used to assess the project and loan conditions and is credited to the credit processing fee. If no application is submitted, the application down payment will be returned or refunded. If the applicant decides to withdraw during the application review, the unused portion of the down payment will be returned.
- Credit Processing Fee: The credit processing fee is payable after the execution of the loan agreement. It reimburses EPA for its costs to provide a loan. The credit processing fee varies for each transaction and is determined by a variety of factors, including the complexity of the transaction, borrower history with the WIFIA Program, and the extent of legal negotiations. After the application down payment, the WIFIA Program estimates the remaining costs due after loan closing to be between $50,000–$150,000 per applicant.
- In addition to the fees required as part of the application process, the WIFIA Program may charge an optional supplemental fee when deemed necessary.
- Annual Fee for loan servicing activities associated with each WIFIA loan, such as credit accounting, collections, maintenance of documents, financial reporting, and construction monitoring.
- Set-Up Fee is equal to the annual servicing fee at loan closing to cover the cost of establishing the borrower's account.
- Fees will be updated in the Federal Register, as appropriate.

6.6 BOR WaterSMART Programs

The Bureau of Reclamation's (BOR's) WaterSMART (Sustain and Manage America's Resources for Tomorrow) Program is a suite of federal funding and technical assistance initiatives designed to support collaborative efforts that address water supply sustainability, improve water-use efficiency, and increase resilience to drought and climate variability specifically for communities, utilities, irrigation districts, Tribes, and watershed coalitions that are facing water stress, infrastructure challenges, or planning needs related to long-term water management in the Western United States.

Funding through the overarching WaterSMART Program is competitive and encompasses numerous programs that support both planning and implementation efforts and offers cost-shared grants for engineering upgrades, conservation measures, water reuse, hydrologic modeling, ecosystem restoration, and collaborative basin-scale planning, and many other project types. The programs under WaterSMART encompass a wide range of eligible project activities that are adaptable to a variety of project types and regional needs. Specifically for water supply and drought resiliency projects, programs under WaterSMART can fund:

- Infrastructure upgrades that reduce water loss and improve delivery efficiency.
- Projects that develop alternative water supplies, such as recycling and desalination.
- Drought contingency planning and implementation of resiliency measures (e.g., aquifer recharge, drought monitoring tools).
- Collaborative planning to assess and address supply-demand imbalances under changing hydrologic conditions.
- Other project types that are considered eligible.

WaterSMART programs provide essential support for communities seeking to modernize infrastructure, diversify water portfolios, and improve system reliability. The programs also promote regional collaboration and science-based decision-making, which are key pillars in building long-term water resilience. Each WaterSMART program operates on its own annual cycle, and timing can vary each year based on administration, appropriations, staffing, review period, and document turnaround.

This report will specifically detail three of the programs offered through the BOR's WaterSMART Program that are well-suited to potentially fund the target projects for the City; however, it's important to note that federal and state funding environments can be dynamic and available programs, City priorities, and the subsequent funding strategy can change and adapt over time as a result.

6.6.1 BOR Water and Energy Efficiency Grants (WEEG) Program

The Water and Energy Efficiency Grants (WEEG) Program provides a cost-shared funding model (typically 50/50) for entities such as irrigation and water districts, Tribal organizations, states, and other authorities engaged in water or power delivery. Projects can include canal lining, metering, SCADA systems, and other infrastructure that deliver quantifiable water savings and enhanced hydropower production within a two- to three-year timeline. The WEEG Program is currently paused by the current presidential administration until further notice as funding priorities are reviewed, but Table 6-1 provides program details from the last two rounds of available FY 2024 and 2025 funding.

Table 6-1: FY 2024 and 2025 WEEG Program Details

Feature	Details
Latest NOFO	R24AS00052
Deadlines	Feb 22, 2024 (FY 2024) & Nov 13, 2024 (FY 2025)
Award Ceilings	$500K / $2M / $5M
Cost-Share	50% federal match; Category caps apply
Eligible Entities	Public water/power authorities & partner nonprofits
Eligible Projects	Water-saving infrastructure and renewable energy

Feature	Details
Award Type	Grant or cooperative agreement
Compliance	NEPA, BABA, Davis-Bacon, procurement requirements, performance tracking

6.6.2 BOR Drought Response Program (DRP)

The Drought Resiliency Projects portion of the Drought Response Program (DRP) supports both planning and infrastructure implementation for drought resilience, with an expected federal cost share of 50%, increasing up to 95% for eligible disadvantaged, rural, or Tribal entities. Infrastructure projects must avoid ineligible components such as land acquisition or general training. The Drought Response Program is currently paused by the current presidential administration until further notice as funding priorities are reviewed, but Table 6-2 provides program details from the previous round of FY 2025 funding.

Table 6-2: FY 2025 Drought Response Program Details

Feature	Details
Latest NOFO	R25AS00013
Deadlines	Oct 7, 2024 (4 p.m. MT)
Award Ceilings	$25K–$750K (2-yr) / $3M (3-yr) / up to $10M (Disadvantaged/Tribal)
Cost-Share	50% standard; up to 95% federal for disadvantaged/Tribal; 5% with waiver
Eligible Entities	Governments, Tribes, nonprofits, small businesses
Eligible Projects	Infrastructure and management projects to bolster drought resilience
Award Type	Grant or cooperative agreement
Compliance	NEPA, BABA, Davis-Bacon, procurement requirements, performance tracking

6.6.3 BOR Title XVI Program

The BOR's Title XVI Water Reclamation and Reuse Program provides federal cost-shared funding to support the planning, design, and construction of water recycling and reuse projects in eligible states. Authorized under Public Law 102-575 and expanded by the Water Infrastructure Improvements for the Nation (WIIN) Act, the program helps communities develop sustainable, drought-resilient water supplies by reclaiming municipal wastewater and impaired groundwater or surface water.

Eligible applicants include local public entities such as water districts, wastewater agencies, tribes, and municipalities. Projects can receive up to 25% of total eligible costs, with a cap of $20 million per project in most cases, although larger-scale projects may exceed this cap under recent federal infrastructure legislation.

Funding is awarded competitively through two primary pathways: Congressionally authorized Title XVI projects and WIIN Act-eligible projects with approved feasibility studies. Successful projects must demonstrate technical, environmental, and financial feasibility in accordance with Reclamation's evaluation criteria. The Title XVI Program is currently paused by the current presidential administration until further notice as funding priorities are reviewed, but Table 6-3 provides program details from the previous round of FY 2024 funding.

Table 6-3: FY 2025 Drought Response Program Details

Feature	Title XVI (Congressionally Authorized)	WIIN Act Title XVI
Latest NOFO Release Date	September 28, 2023	September 28, 2023
Application Deadlines	Period 1: December 7, 2023; Period 2: September 20, 2024	Period 1: December 7, 2023; Period 2: September 20, 2024
Award Ceilings	Up to $30M per project (≤25% of project cost)	Typically, up to $20M; some cases up to $30M per project; (≤25% of project cost)
Cost-Share	Up to 25% of project cost, 75% non-Federal match	Up to 25% of project cost, 75% non-Federal match
Eligibility Requirements	53 congressionally authorized Title XVI projects with feasibility study submitted per WTR 1101 by November 29, 2024	Projects with approved feasibility study submitted by deadlines (August 30/November 29, 2024) under WTR 1101, within 17 Western states & HI
Eligible Projects	Water recycling and reuse projects	Water recycling and reuse projects
Award Type	Grant or cooperative agreement	Grant or cooperative agreement
Compliance	NEPA, BABA, Davis-Bacon, procurement requirements, performance tracking	NEPA, BABA, Davis-Bacon, procurement requirements, performance tracking

6.7 Funding Strategy Summary

An adaptive and dynamic funding strategy is the most effective way to approach funding. The City can pursue a diversified funding approach for water supply diversification by leveraging state and federal programs that align with its financial and demographic profile. Due to its status as a small, disadvantaged community, Beeville is well-positioned to access principal forgiveness and grant-based funding under several key programs.

The TWDB offers three good options for funding that include, but are not limited to, the DWSRF, SWIFT, and DFund Programs. At the federal level, the EPA's Water Infrastructure Finance and Innovation Act (WIFIA) Program and programs included in the Bureau of Reclamation's (BOR) WaterSMART Program present several complementary opportunities. Beeville should be a particularly strong candidate for these programs based on population and income criteria.

While these programs provide substantial financial incentives, they also come with rigorous procurement, environmental, and labor compliance requirements, especially for federally funded projects. The City must ensure adherence to 2 CFR Part 200, Davis-Bacon Act, Buy America, and Disadvantaged Business Enterprise (DBE) mandates, among others, throughout project implementation.

By aligning project timing, eligibility characteristics, and compliance capabilities with the right combination of federal and state programs, Beeville can maximize access to low-cost financing and potential grants. A phased strategy that initially targets programs with the quickest turnaround to obtaining funding will offer the City flexibility and financial efficiency in delivering critical water infrastructure and resiliency improvements.

7.0 Water Supply Strategy Development

Based on this evaluation, the City's water portfolio can be expanded to include fully redundant and drought resilient water sources. The water demand and supply gap analysis suggested that 3 MGD of flow is needed initially and that over the ten-year planning period, the additional sources should be expanded to provide up to 6 MGD of additional water.

There are multiple options for supplying this water to the City. Because of the critical need to offset surface water in response to the ongoing drought, an approach with three phases is recommended.

- Phase 1 (0-12 Months) – Develop existing City wells and implement well head reverse osmosis
- Phase 2 (12-24 Months) – Centralize and expand the City's brackish RO system
- Phase 3 (42-60 Months) – Implement Potable Reuse or Welder Ranch Water Supply

7.1 Phase 1 – Well Head Brackish Groundwater RO (6 to 12 Months to Completion)

Based on recent third-party inspections, Well 6 and Well 7 can be rehabbed to provide approximately 1.0 to 1.5 MGD of slightly brackish groundwater. The development of two additional wells is also recommended to provide a firm water supply of 3.5 MGD.

Reverse osmosis treatment should be implemented at each well site. Coordination with TCEQ is needed to permit emergency brine discharge to Poesta Creek where the existing Moore Street WWTPs can provide dilution to help manage salinity in the slightly brackish receiving body. The emergency brine discharge authorization is needed as an interim solution while the City designs and implements brine disposal wells.

This phase of work should also be performed in parallel with water system master planning to determine final timeframes and select the water source for Phase 3 development.

7.2 Phase 2 – Centralize and Expand the Brackish RO System

During this phase of work, additional wells will be developed on City owned properties. The new wells will be routed to a centralized RO treatment plant at the Cleveland Street site. Once the new wells have been connected to the site and the treatment facility has been constructed and placed into service, the City will relocate the existing wellhead RO units and connect the Phase 1 wells to the centralized treatment facility.

During this phase of work, the City will design and permit brine disposal wells.

7.3 Phase 3 – Develop Secondary Water Source

The City will develop an alternative water supply, using either potable reuse or fresh groundwater. During this phase of work, the City will also implement brine disposal by deep well injection if pursuing DPR.

7.4 Project Action Plan

The following action plan, presented in Table 7-1, summarizes the proposed project action plan.

Table 7-1: Project Action Plan

Phase of Work	Completion Date	Anticipated Construction Cost[1]	New Water Treatment Capacity	Description
Phase 1	12 Months	$32M	3 MGD	Rehab groundwater wells, implement well head RO. Implement surface brine disposal. Complete master planning for City water system.
Phase 2	36 Months	$47M	3 MGD	Implement centralized RO. Design and Permit brine disposal wells.
Phase 3	60 Months	$65M	3 MGD	Implement secondary water supply and brine disposal wells.
Table Notes: 1. Anticipated Construction costs do not include engineering, permitting or bidding service costs.				

8.0 Conclusion and Recommendations

The City's primary water supply from Lake Corpus Christi has demonstrated significant risk of drought related water shortages. To help ensure that water is available during the ongoing drought and to improve drought resiliency in the future, alternative water supply options were evaluated. Based on the demand analysis performed during this evaluation, up to 7 MGD of alternative water supply is needed to ensure drought resiliency over the next ten-year planning window.

Short and long-term options were evaluated during this study. Because of the immediate need for water in response to the ongoing drought, well-headed RO is recommended for emergency implementation. This water can be rapidly brought online because RO systems have relatively short construction time and can be easily redeployed into a more permanent installation in the future. During this phase of work, surface water brine discharge will be needed. The surface water discharge can be rapidly deployed, in comparison to the development of brine disposal wells.

After emergency RO deployment, centralization of RO treatment is recommended. This approach will help the City optimize their operations and will provide a long-term solution to meet the City's water supply needs. It is also recommended that brine disposal wells be designed and permitted during this phase of work.

After the brackish groundwater treatment system has been completed, it is recommended that the City develops a secondary water supply and constructs the brine disposal wells. Because of the potential risk of upsets and water quality degradation that may occur for a new groundwater well system located outside of the City, potable reuse is recommended.

A conceptual level cost evaluation was performed to help assess these water supply alternatives. The conceptual level costs are sufficient for budget planning. It is also recommended that additional master planning be undertaken to refine project assumptions used in the development of this study and to refine the projected water demand used for this evaluation and to help confirm tie-in locations for new wells and locations for Phase 2 well sites.

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